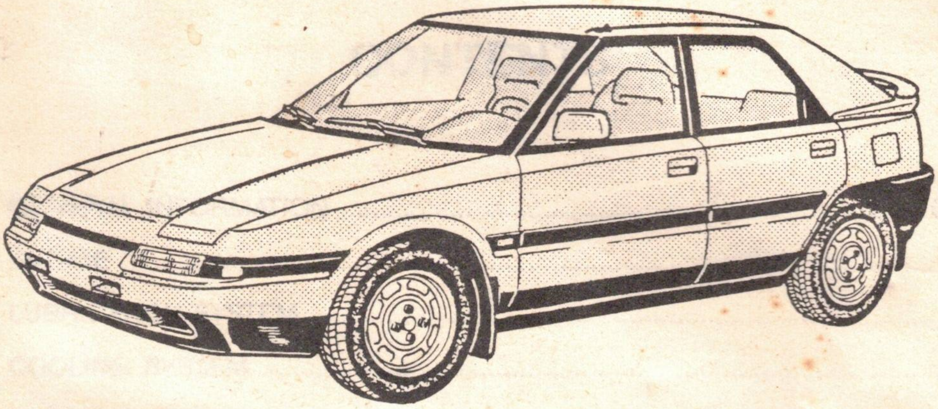
LASER



TX3

INCLUDING 4WD
AND TURBO

TECHNICIAN NOTES

Ford

89/12

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GENERAL INFORMATION

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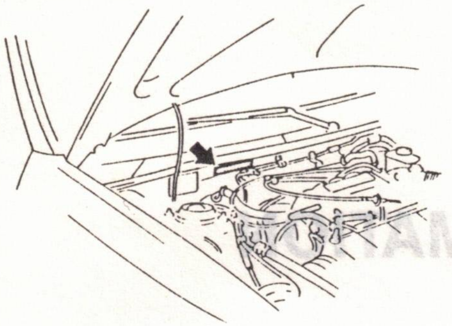
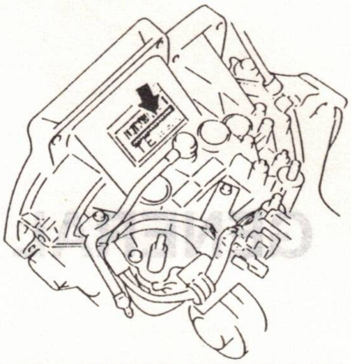
IDENTIFICATION NUMBER LOCATIONS

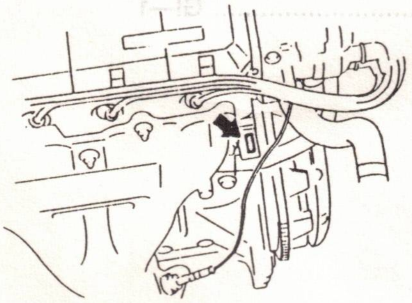
VEHICLE IDENTIFICATION NUMBER (VIN)



AUTOMATIC TRANSAXLE MODEL AND NUMBER



ENGINE MODEL AND NUMBER



9MUGIX-015

UNITS

N·m (m-kg or cm-kg, ft-lb or in-lb)	Torque
rpm	Revolutions per minute
A	Ampere(s)
V	Volt(s)
Ω	Ohm(s) (resistance)
kPa (kg/cm², psi)	Pressure (usually positive)
mmHg (inHg)	Pressure (usually negative)
W	Watt
liters (US qt, Imp qt)	Volume
mm (in)	Length

89U0GX-006

ABBREVIATIONS

ABDC	After bottom dead center
A/C	Air conditioner
ACC	Accessories
ATX	Automatic transaxle
ATDC	After top dead center
ATF	Automatic transmission fluid
BAC	Bypass air control
BBDC	Before bottom dead center
BTDC	Before top dead center
CPU	Central processing unit
EC-AT	Electronically-controlled automatic transmission
ECU	Engine control unit
EGI	Electronic gasoline injection
E/L	Electrical load
EX	Exhaust
IC	Integrated circuit
IGN	Ignition
IN	Intake
INT	Intermittent
ISC	Idle speed control
LH	Left hand
M	Motor
MIL	Malfunction indicator lamp
MTX	Manual transaxle
OD	Overdrive
OFF	Switch off
ON	Switch on
PCV	Positive crankcase ventilation
PRC	Pressure regulator control
P/S	Power steering
P/W	Power window
RH	Right hand
SST	Special service tool
ST	Start
SW	Switch
TDC	Top dead center
4WD	4-wheel drive

ENGINE
(DOHC)

OUTLINE

OUTLINE OF CONSTRUCTION .... B—1
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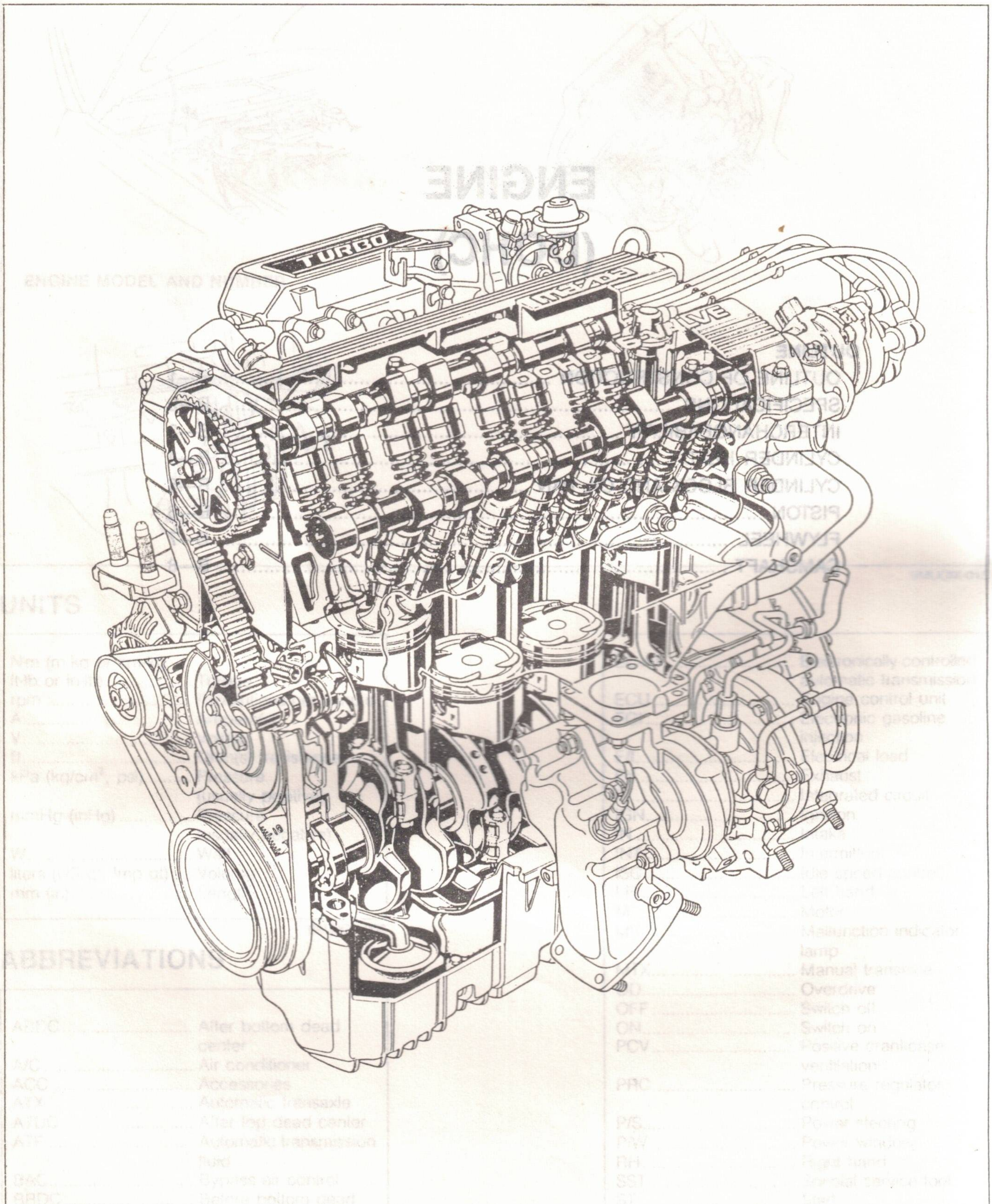
OUTLINE

OUTLINE OF CONSTRUCTION

The BP DOHC Turbo engine for the 4WD model is the BP DOHC Non-Turbo engine of the 2WD model to which a turbocharger with intercooler has been added. With these additions, engine response is improved and more power is attained.



SPECIFICATIONS

Item			Engine	BP DOHC Turbo
Type				Gasoline, 4-cycle
Cylinder arrangement and number				In-line, 4 cylinders
Combustion chamber				Pentroof
Valve system				DOHC, belt-driven
Displacement			cc (cu in)	1,839 (112.2)
Bore and stroke			mm (in)	83.0 x 85.0 (3.27 x 3.35)
Compression ratio				8.2
Compression pressure			kPa (kg/cm^2, psi)-rpm	1,059 (10.8, 154)-300
Valve timing	IN	Open	BTDC	2°
		Close	ABDC	51°
	EX	Open	BBDC	59°
		Close	ATDC	8°
Valve clearance	mm (in)	IN		0: Maintenance-free
		EX		0: Maintenance-free
Idle speed			rpm	800 ± 50*
Ignition timing			BTDC	10° ± 1°*
Firing order				1—3—4—2

*...TEN terminal of diagnosis connector grounded

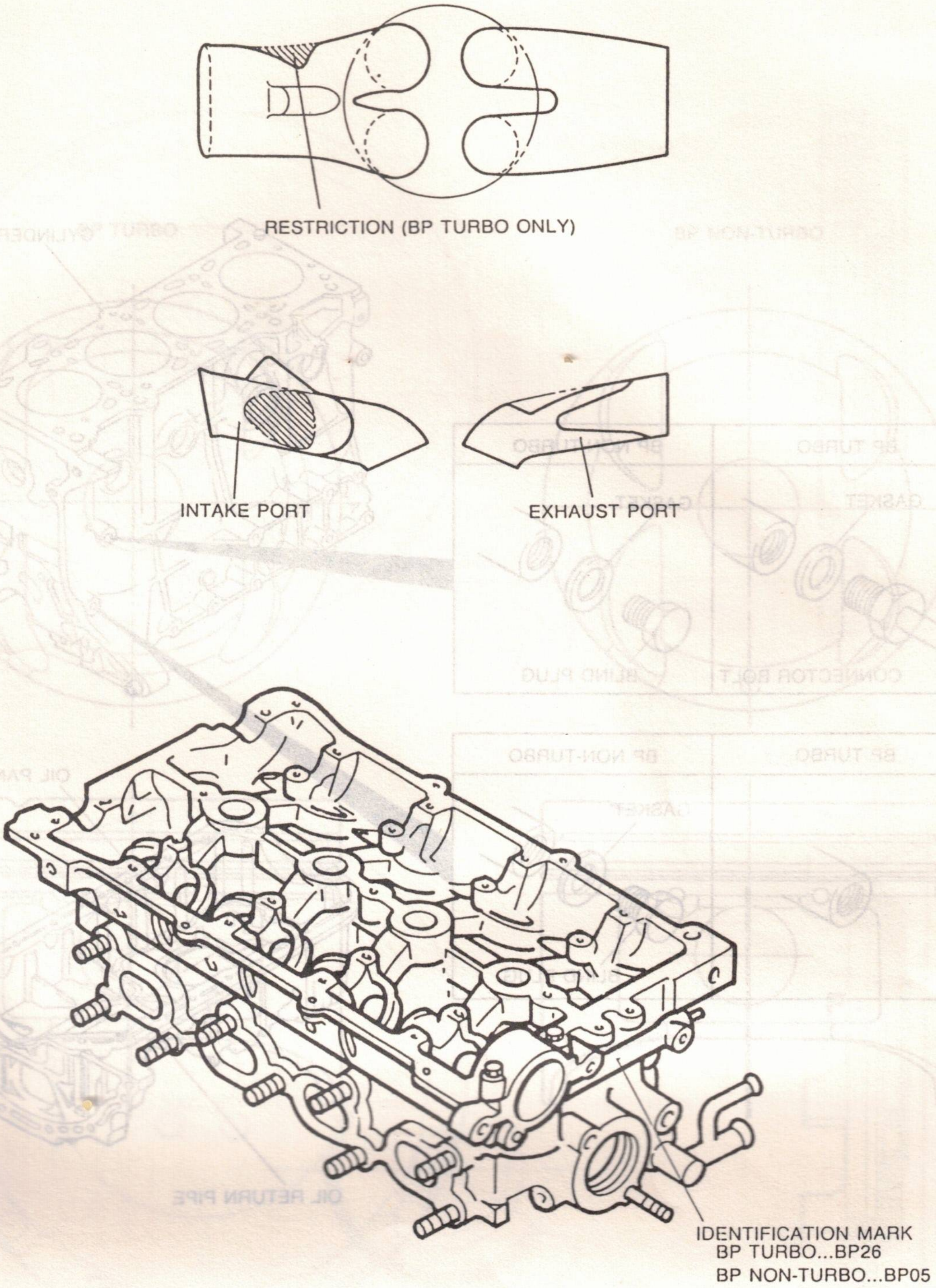
INTERCHANGEABILITY

The following chart shows the interchangeability of the main components of the BP DOHC Turbo engine for the 4WD model and the BP DOHC Non-Turbo engine for the 2WD model.

Symbols: ○ .... Interchangeable   X .... Not interchangeable

Part name			Interchangeability	Remark
Cylinder block related	Cylinder head		×	Shape different
	Camshaft oil seal		○	
	Cylinder head bolt		○	
	Cylinder head gasket		○	
	Cylinder head cover		○	
	Cylinder head cover gasket		○	
	Cylinder block		○	
	Main bearing cap		○	
	Main bearing support plate		○	
	Oil pan		×	Shape different
	Timing belt cover		○	
	Seal plate		○	
	Front oil seal		○	
	Rear oil seal		○	
Crankshaft related	Crankshaft		○	
	Main bearing		○	
	Thrust bearing		○	
	Connecting rod and cap		○	
	Connecting rod bearing		○	
	Piston		×	Shape different
	Piston pin		○	
	Piston ring		○	
	Crankshaft pulley		○	
	Rear cover		○	
	Flywheel		X	Shape different
	Flywheel bolt		○	
Timing belt related	Timing belt		○	
	Timing belt crank pulley		○	
	Camshaft pulley		○	
	Timing belt tensioner and spring		○	
	Idler		○	
Valve related	Camshaft		×	Valve timing different
	HLA		○	
	Valve	Intake	○	
		Exhaust	○	
	Valve spring and seat	Intake	○	
		Exhaust	○	
	Valve guide		○	
	Valve seal		○	
Lubrication system related	Oil pump		○	
	Oil pump gasket		○	
	Oil strainer		○	
	Oil strainer gasket		○	
	Oil cooler		○	
	Oil jet		○	
	Oil filter		○	
Cooling system related	Water pump		○	
	Thermostat		×	Specification different
	Radiator		×	Specification different
	Cooling fan		×	Specification different

CYLINDER HEAD

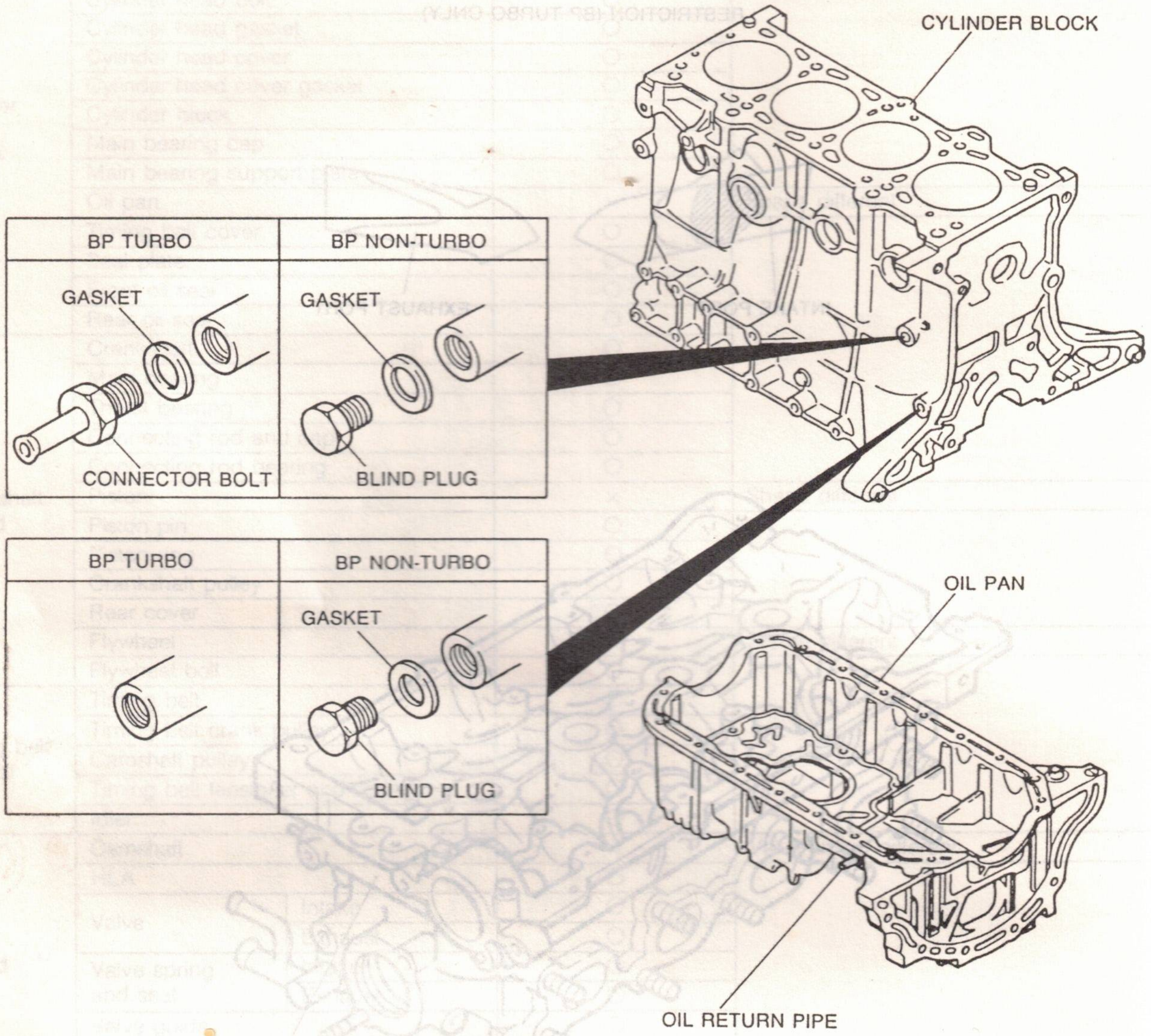


The cylinder head for the BP DOHC Turbo engine is the same as for the BP DOHC Non-Turbo engine, except that the intake ports are shaped differently.
The identification mark is cast at the rear of the cylinder head.

Identification:

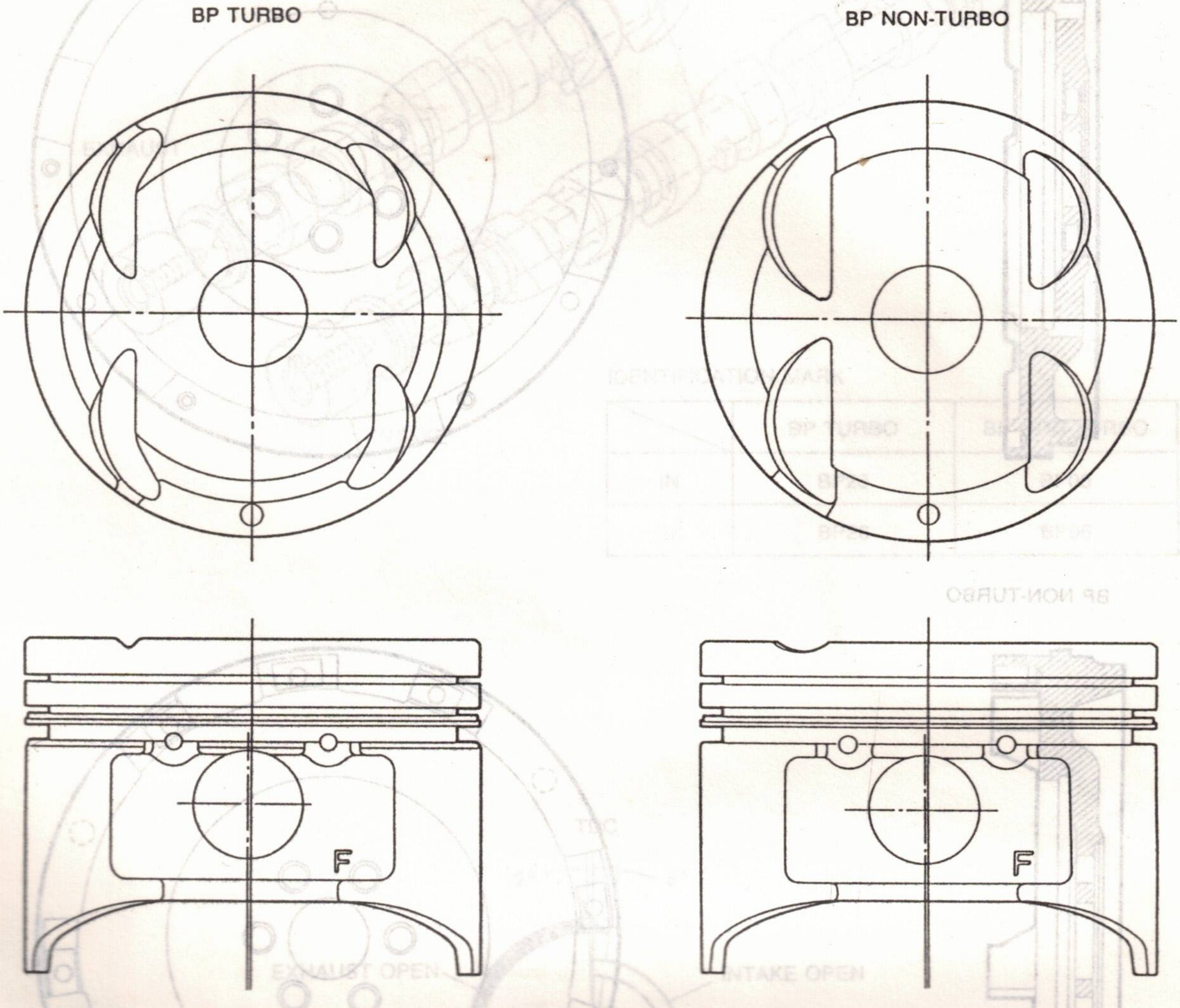
BP DOHC Turbo : BP26
BP DOHC Non-Turbo: BP05

CYLINDER BLOCK AND OIL PAN



The cylinder block due to the addition of a turbocharger, has coolant, and lubrication oil passages provided. The oil pan has a provision for oil to return from the turbocharger.

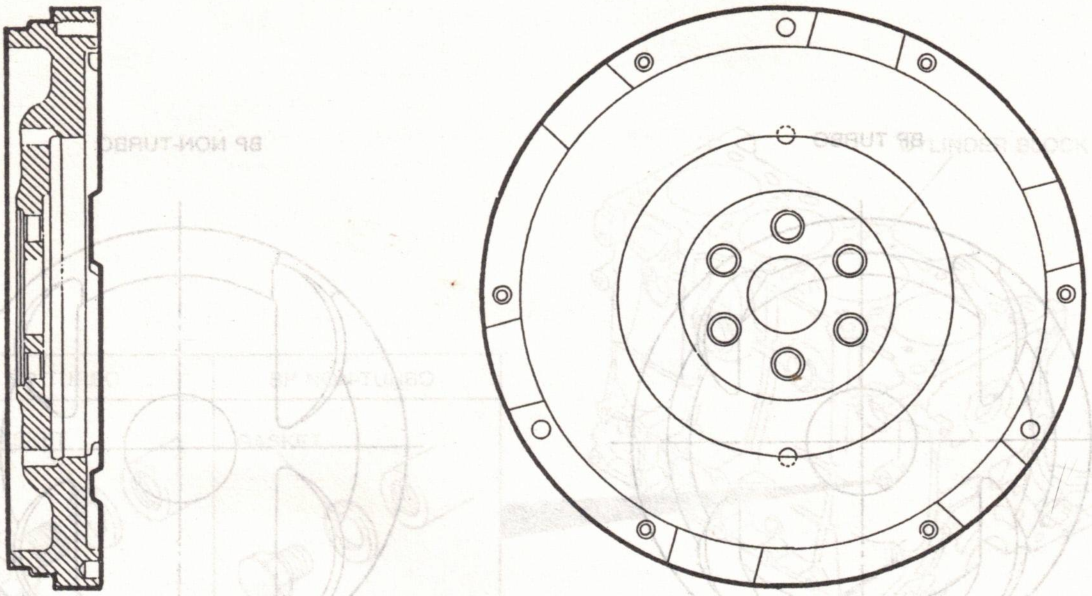
PISTON



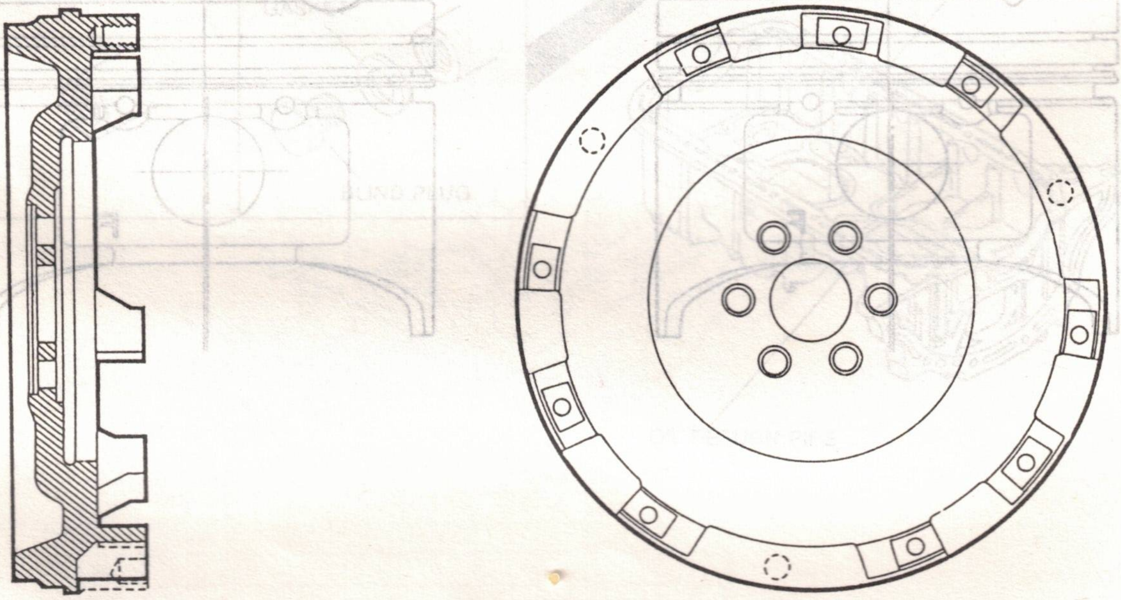
With the addition of the turbocharger, the piston crown recess is increased to lower the compression ratio.

FLYWHEEL

BP TURBO

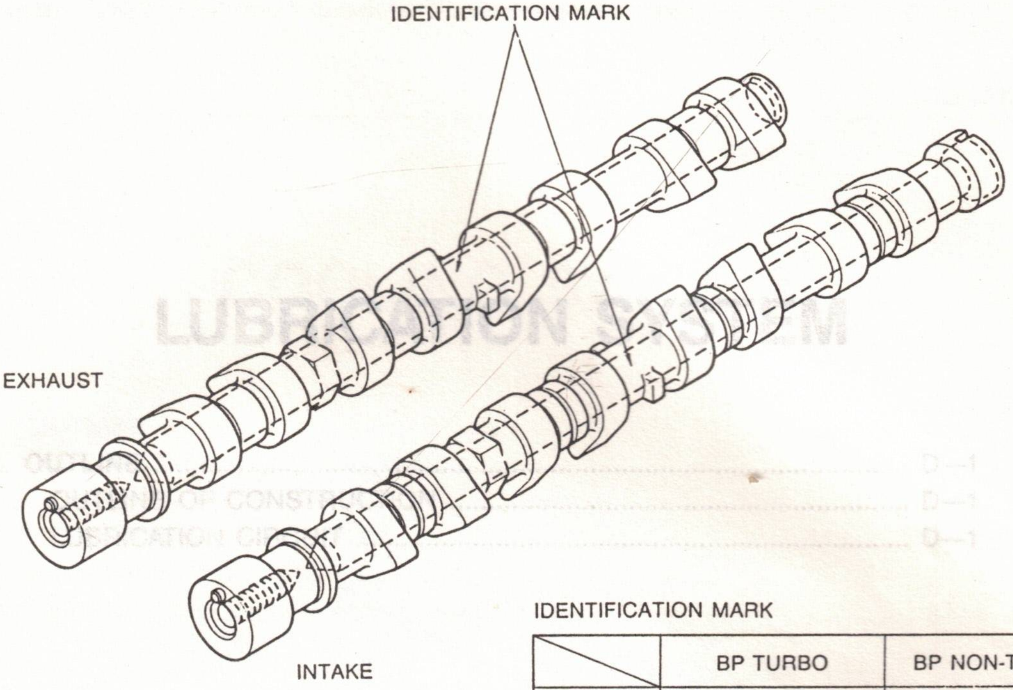


BP NON-TURBO



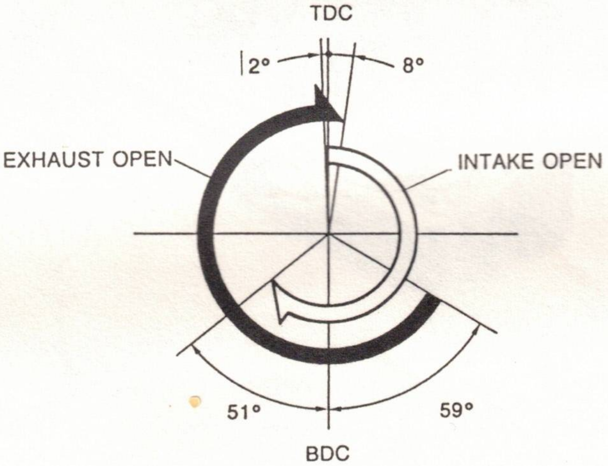
The flywheel is shaped differently to accommodate the redesigned clutch disc and clutch cover.

CAMSHAFT



IDENTIFICATION MARK

	BP TURBO	BP NON-TURBO
IN	BP26	BP05
EX	BP26	BP06



The camshaft valve timing specifications are different to improve engine power.

LUBRICATION SYSTEM

OUTLINE .... D—1

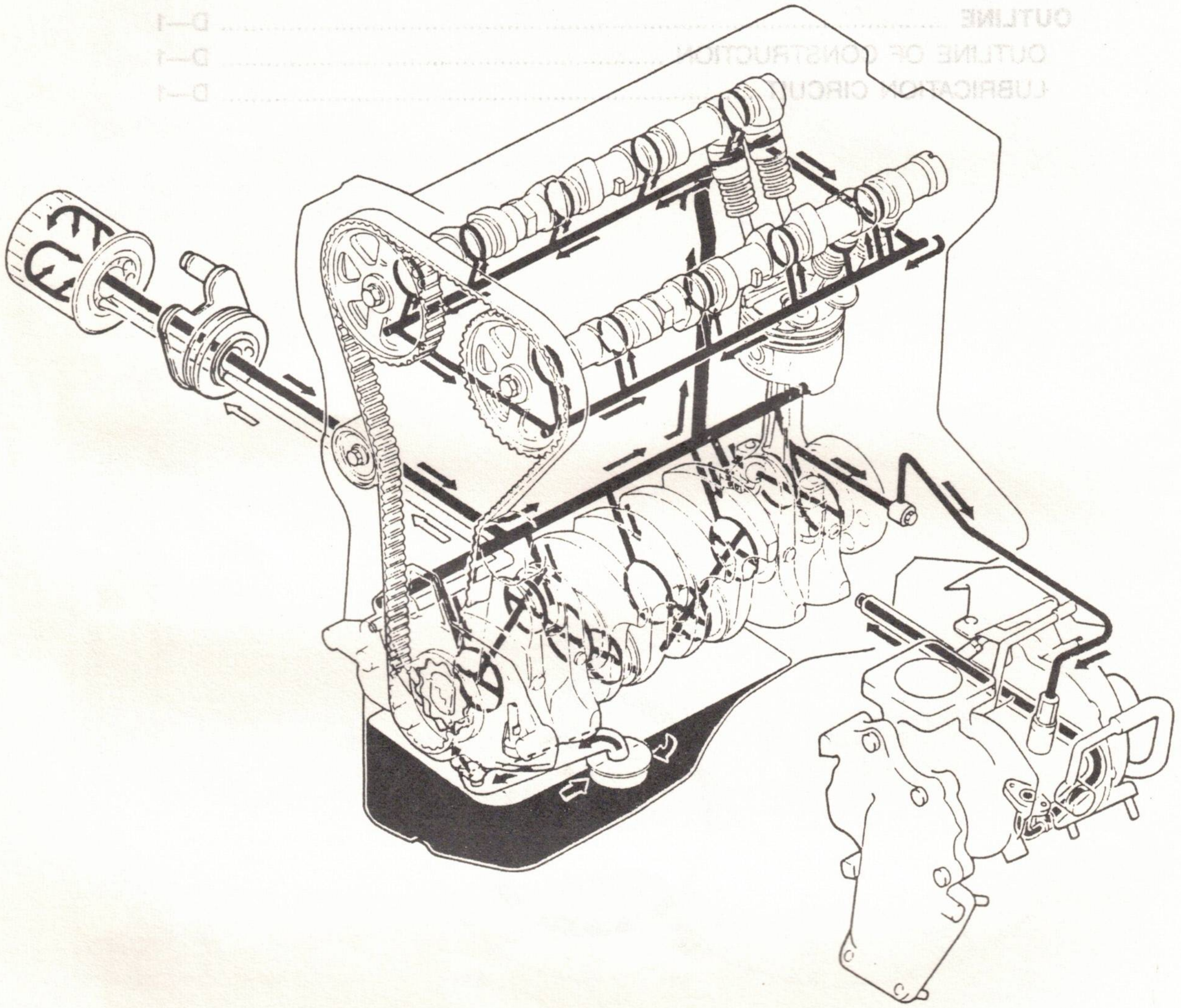
- OUTLINE OF CONSTRUCTION .... D—1
- LUBRICATION CIRCUIT .... D—1

OUTLINE

OUTLINE OF CONSTRUCTION

The lubrication system of the Laser 4WD engine is the same as for the 2WD model.
The BP DOHC turbocharged engine oil circulation path is different than that of the BP DOHC non-turbocharged engine because of the turbocharger lubrication.

LUBRICATION CIRCUIT



COOLING SYSTEM

OUTLINE

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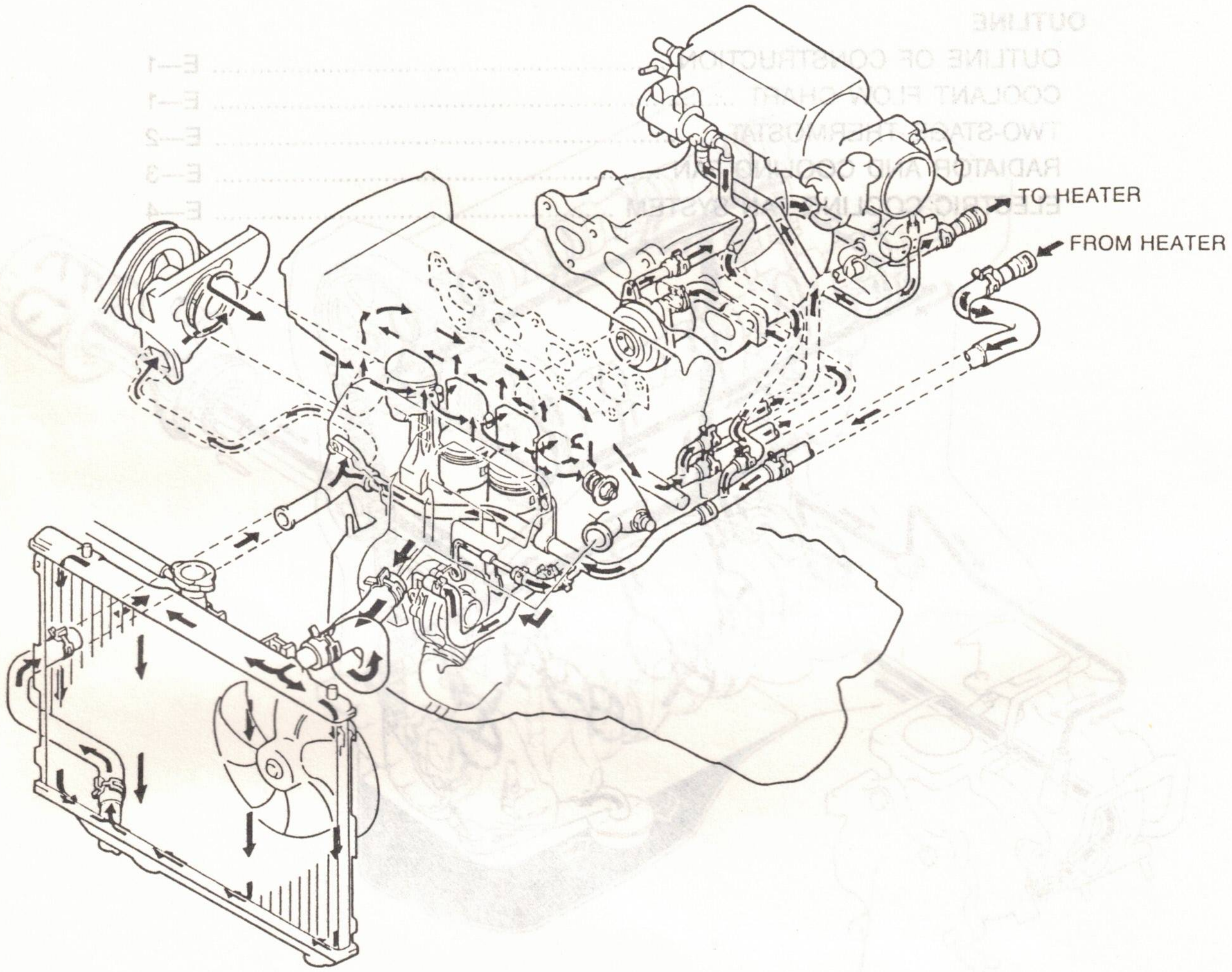
TWO-STAGE THERMOSTAT .... E—2
RADIATOR AND COOLING FAN .... E—3
ELECTRIC COOLING FAN SYSTEM .... E—4

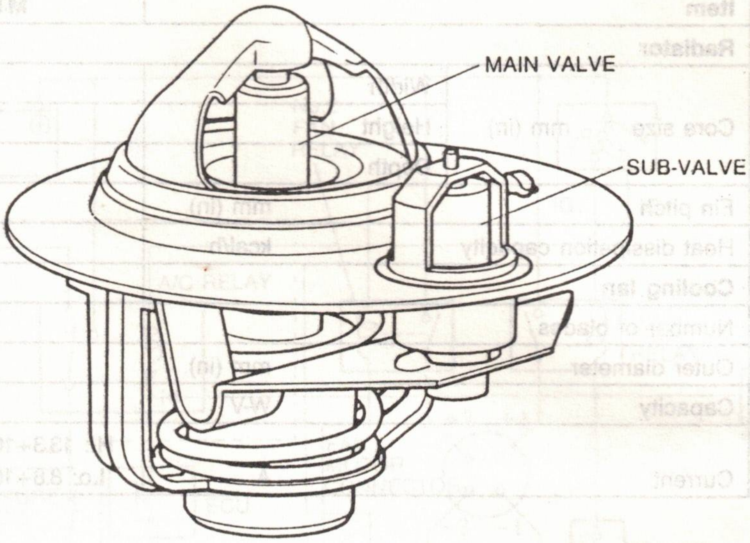
OUTLINE OF CONSTRUCTION

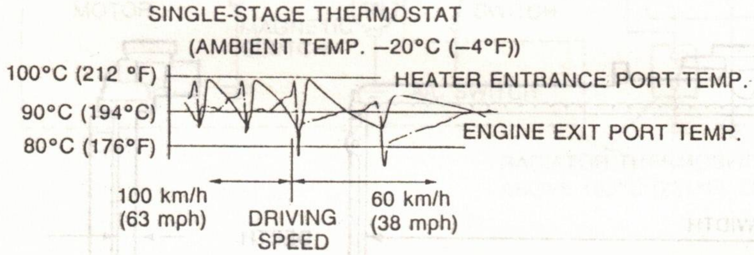
The cooling system in the Laser 4WD model is basically similar to the Laser 2WD model. Although there is no fundamental change from the BP DOHC of the 2WD model, the coolant circulation path has been changed to direct coolant to the water-cooled turbocharger.
A Two stage thermostat is used in the BP DOHC turbocharged engine to stabilize the engine coolant temperature. The radiator and cooling fan specifications are different. The BP DOHC turbocharged engine of the 4WD model uses a two-speed electric cooling fan.

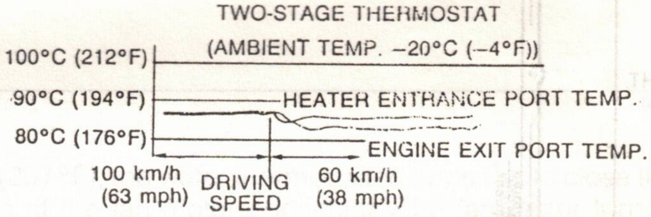
COOLANT FLOW CHART (BP DOHC TURBO)



TWO-STAGE THERMOSTAT (BP DOHC TURBO)







A sub-valve is incorporated in the thermostat to stabilize the coolant temperature in the engine, to improve cold weather performance, and to reduce heater output temperature fluctuations as noted in the diagram.

Operation

Stage 1

During cold weather operation, 83.5°C [182°F]—86.5°C [188°F] only the sub-valve opens to control the engine coolant temperature.

Stage 2

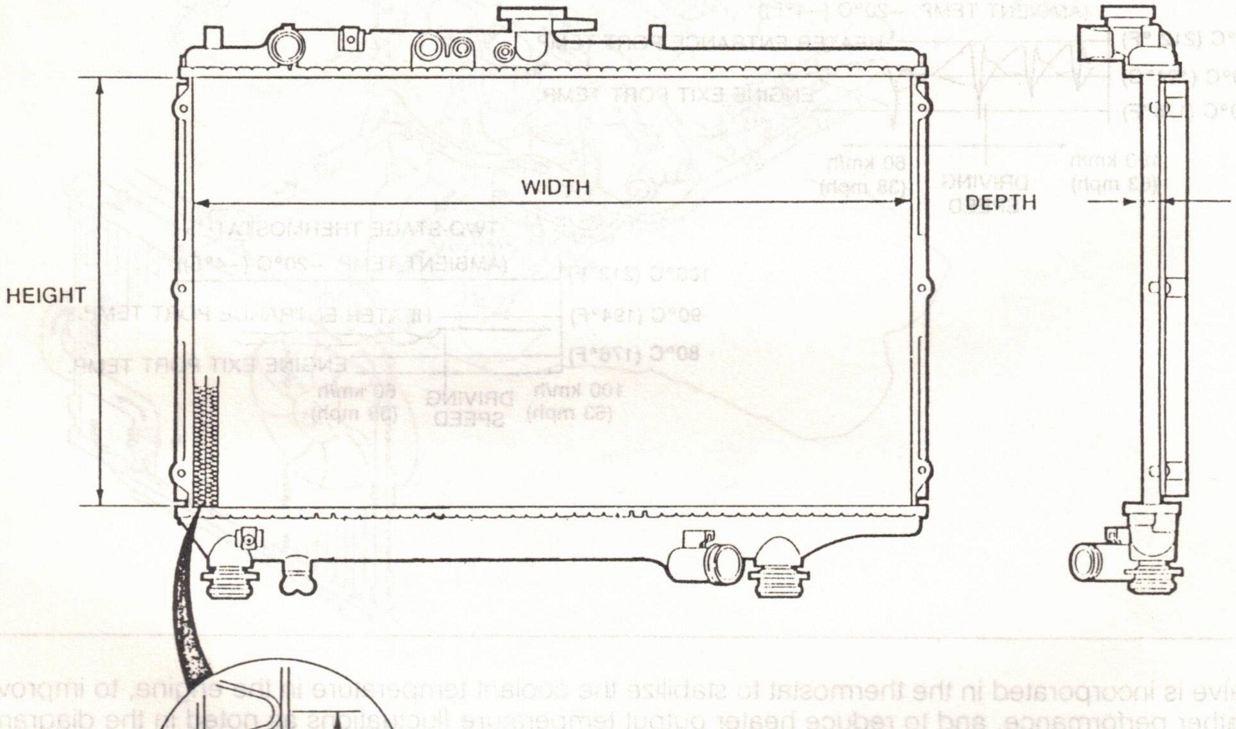
During normal operation, 86.5°C (188°F)—89.5°C (193°F) the main valve opens to permit increased coolant flow through the radiator.

RADIATOR AND COOLING FAN

The radiator and cooling fan specifications are revised.

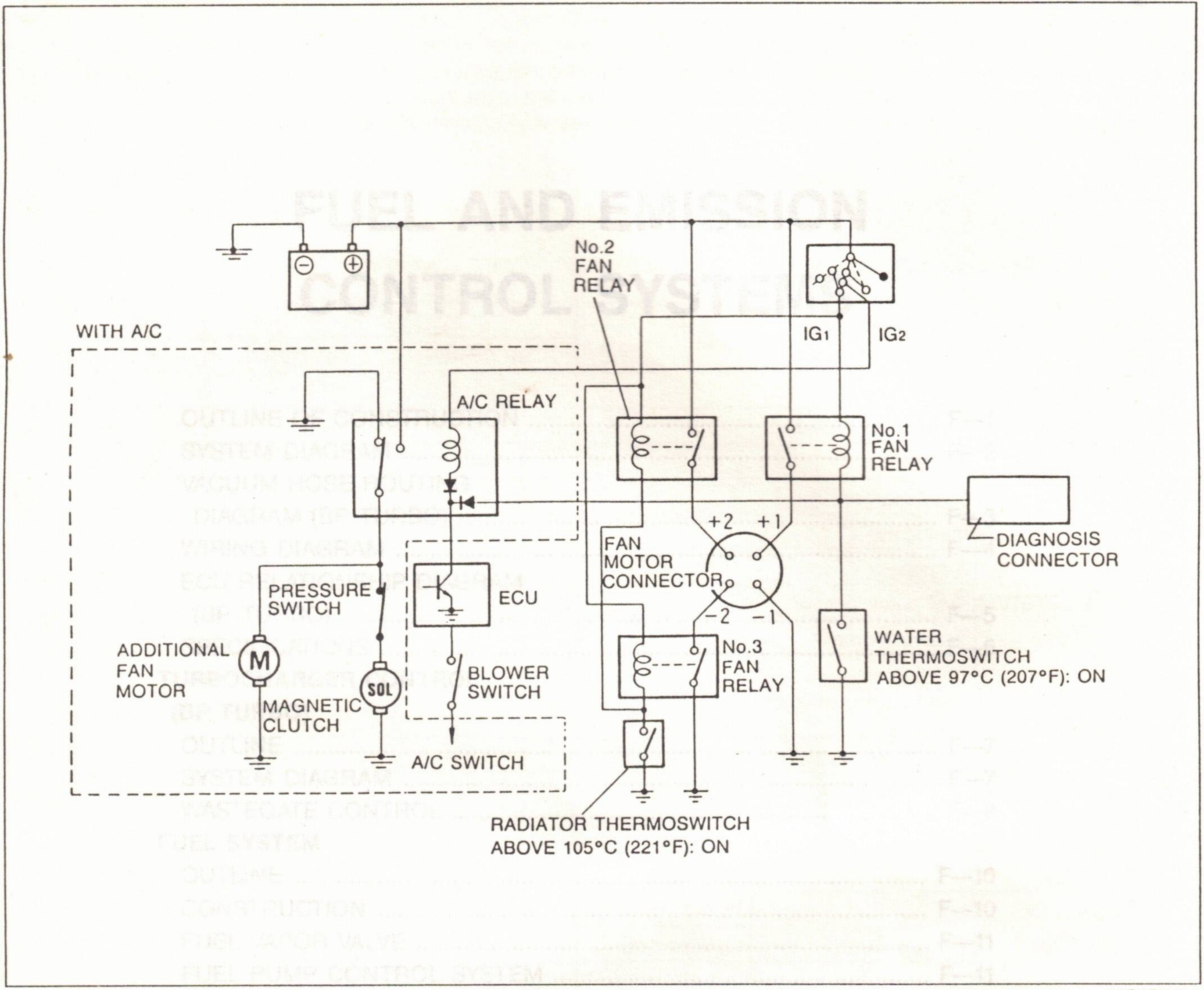
Specifications

Item		Engine/Transaxle	BP DOHC Turbo
			MTX
Radiator			
Core size mm (in)	Width		647
	Height		390
	Depth		25
Fin pitch		mm (in)	1.3
Heat dissipation capacity		kcal/h	43,800
Cooling fan			
Number of blades			5
Outer diameter		mm (in)	340
Capacity		W-V	160-12
Current		A	Hi: 13.3+10% max. Lo: 8.8+10% max.



ELECTRIC COOLING FAN SYSTEM (BP DOHC TURBO)

System Circuit



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Operation

1. When the coolant temperature exceeds 97°C (207°F), the water thermoswitch turns ON to close the No.1 relay, and connects the +1 and −1 terminals of the fan motor connector. The fan motor turns at low speed (about 1,660 rpm).
2. When the coolant temperature exceeds 105°C (221°F), the radiator thermoswitch turns ON, to close the No.2 and No.3 relays, and connects the +2 and −2 terminals of the fan motor connector. The fan motor turns at high speed (about 2,200 rpm).
3. If the vehicle is equipped with air conditioning, the cooling fan motor operates whenever the A/C switch and the blower switch are on, regardless of the coolant temperature.
   Also, when the A/C switch and the blower switch are on, the A/C relay closes to operate the additional fan motor.

Note
- **The water thermoswitch and the cooling fan relay are normally-open switches.**

Checking cooling fan operation

1. Jump across the TFA and the GND terminals of the diagnosis connector with a jumper wire.
2. Turn the ignition switch to ON and verify that the cooling fan operates smoothly.

Note
- **When the water thermoswitch connector is disconnected, the cooling fan will not operate.**

FUEL AND EMISSION CONTROL SYSTEMS

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SPECIFICATIONS .... F—6

TURBOCHARGER CONTROL (BP TURBO)

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FUEL SYSTEM

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OUTLINE

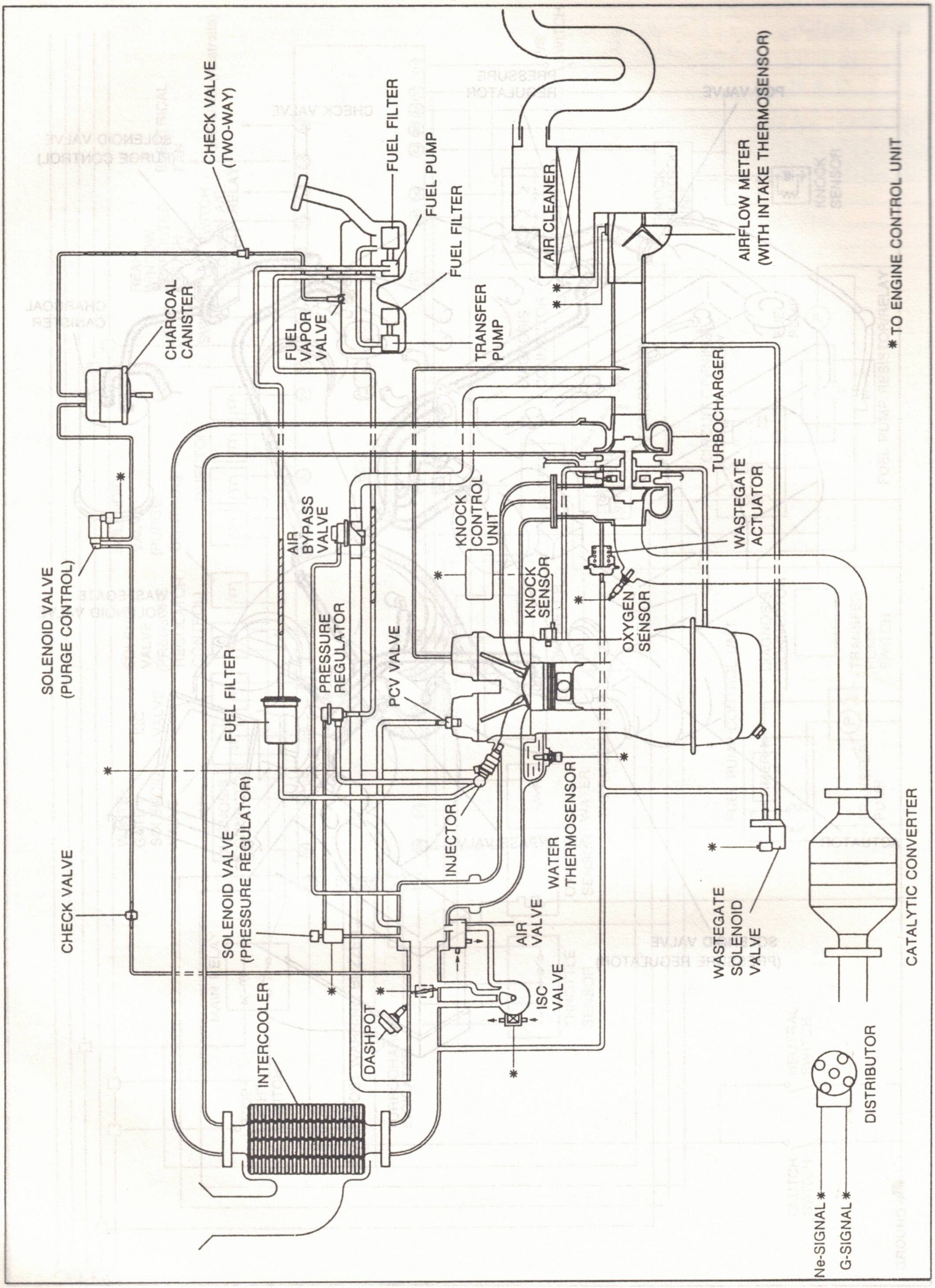
OUTLINE OF CONSTRUCTION

The fuel and emission control system of the new Laser 4WD model is basically the same as that of the new Laser 2WD model; however, a turbocharger and knock control system are added to the BP TURBO model and the fuel tank is designed with separate right and left sections due to the installation of the propeller shaft for the 4-wheel-drive system. A transfer pump is also fitted to pump the fuel from the left to the right (fuel pump side) section of the fuel tank. The major points of difference between the 2WD model and 4WD model are as shown below.

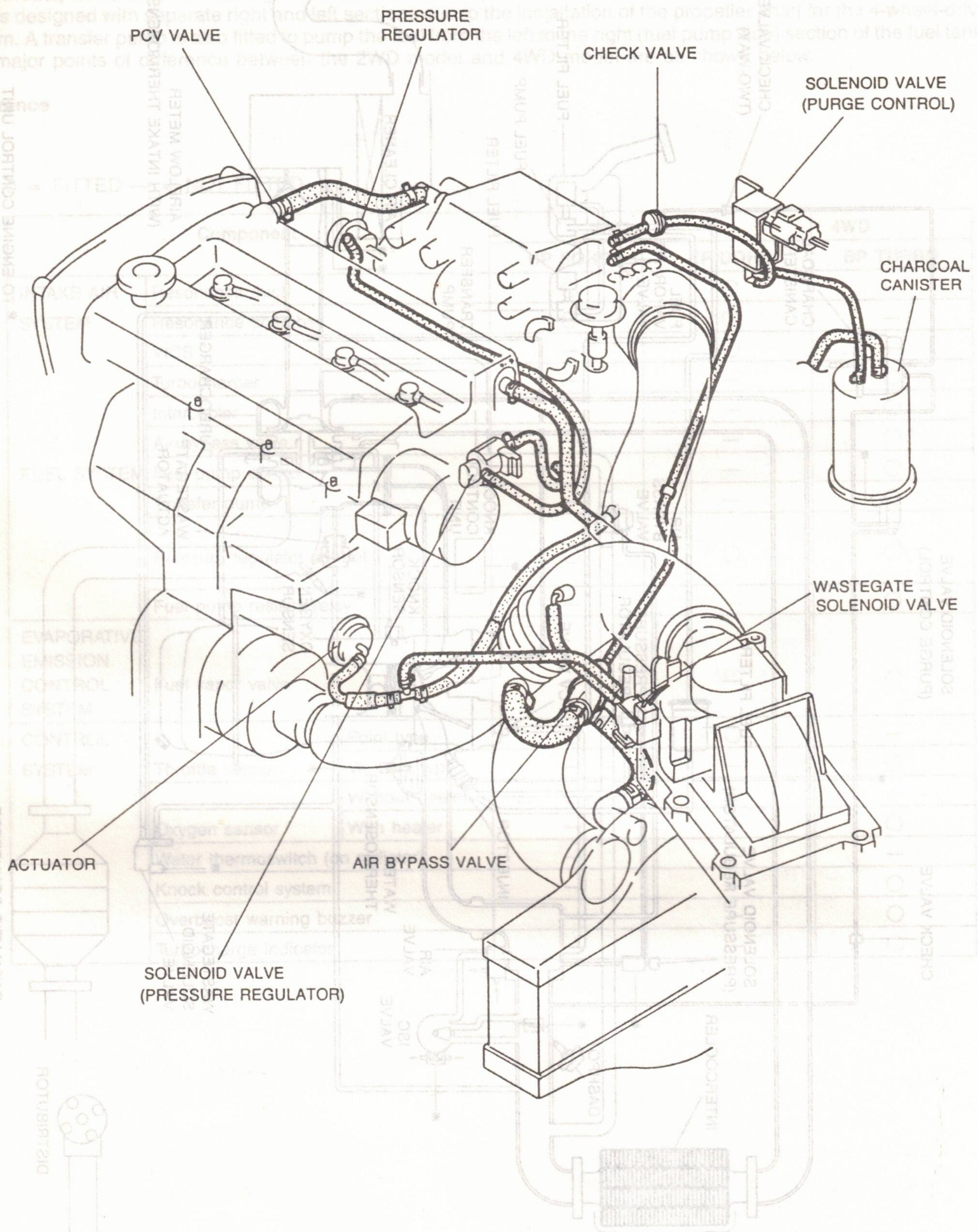
Difference

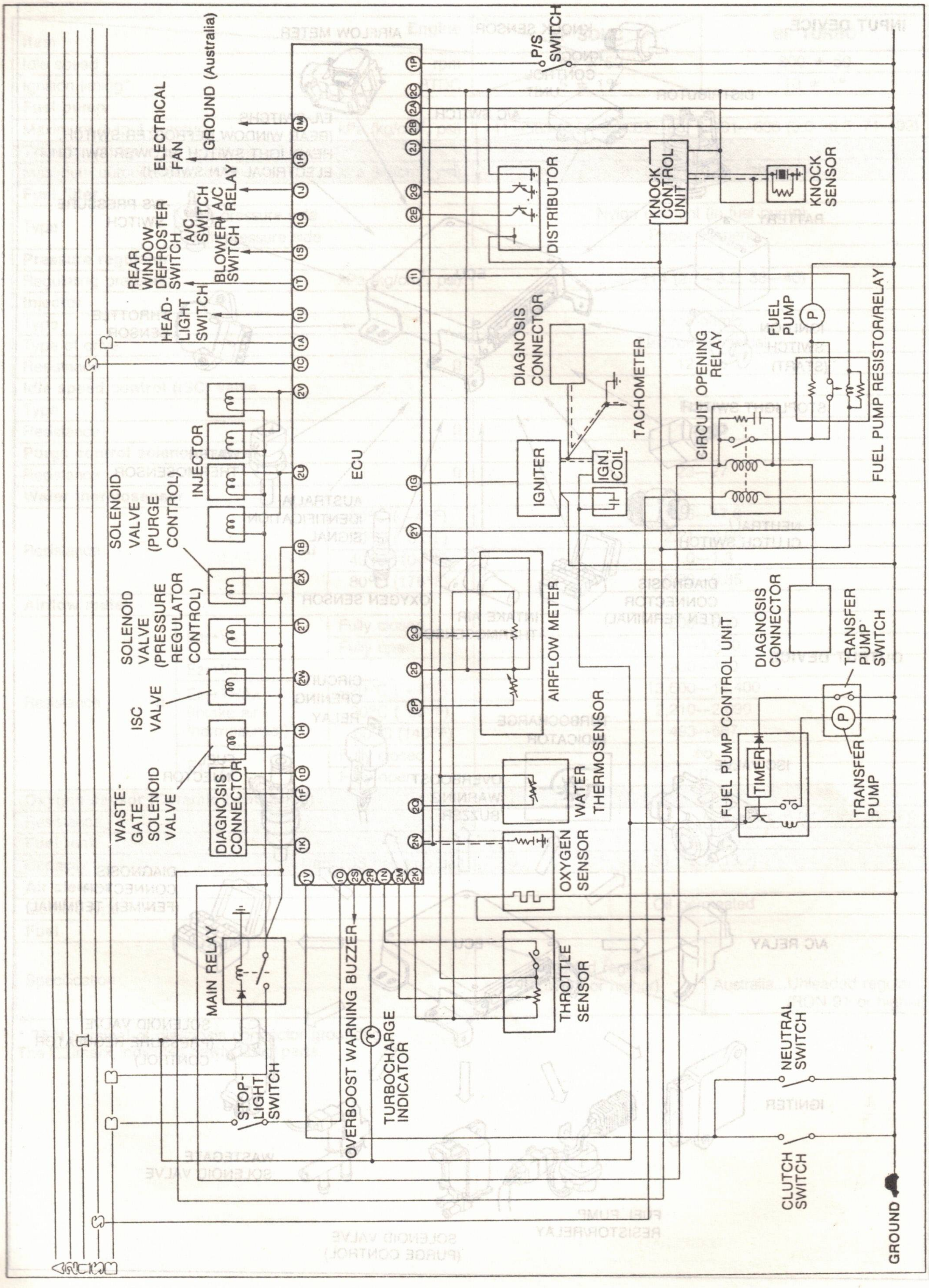
0 = FITTED — = NOT FITTED

Component			2WD		4WD
			BP SOHC	BP DOHC	BP TURBO
INTAKE AIR SYSTEM	Resonance duct		○	○	—
	Resonance chamber		○	○	—
	VICS		—	○	—
	Turbocharger		—	—	○
	Intercooler		—	—	○
	Air bypass valve		—	—	○
FUEL SYSTEM	Fuel pump control		—	—	○
	Transfer pump		—	—	○
	Pressure regulator control		○	○	○
	Fuel pump resistor/relay		—	—	○
EVAPORATIVE EMISSION CONTROL SYSTEM	Fuel vapor valve		—	—	○
CONTROL SYSTEM	Throttle sensor	Point type	○	○	—
		Variable type	—	—	○
	Oxygen sensor	Without heater	○	○	—
		With heater	—	—	○
	Water thermoswitch (on radiator)		—	—	—
	Knock control system		—	—	○
	Overboost warning buzzer		—	—	○
	Turbocharge indicator		—	—	○

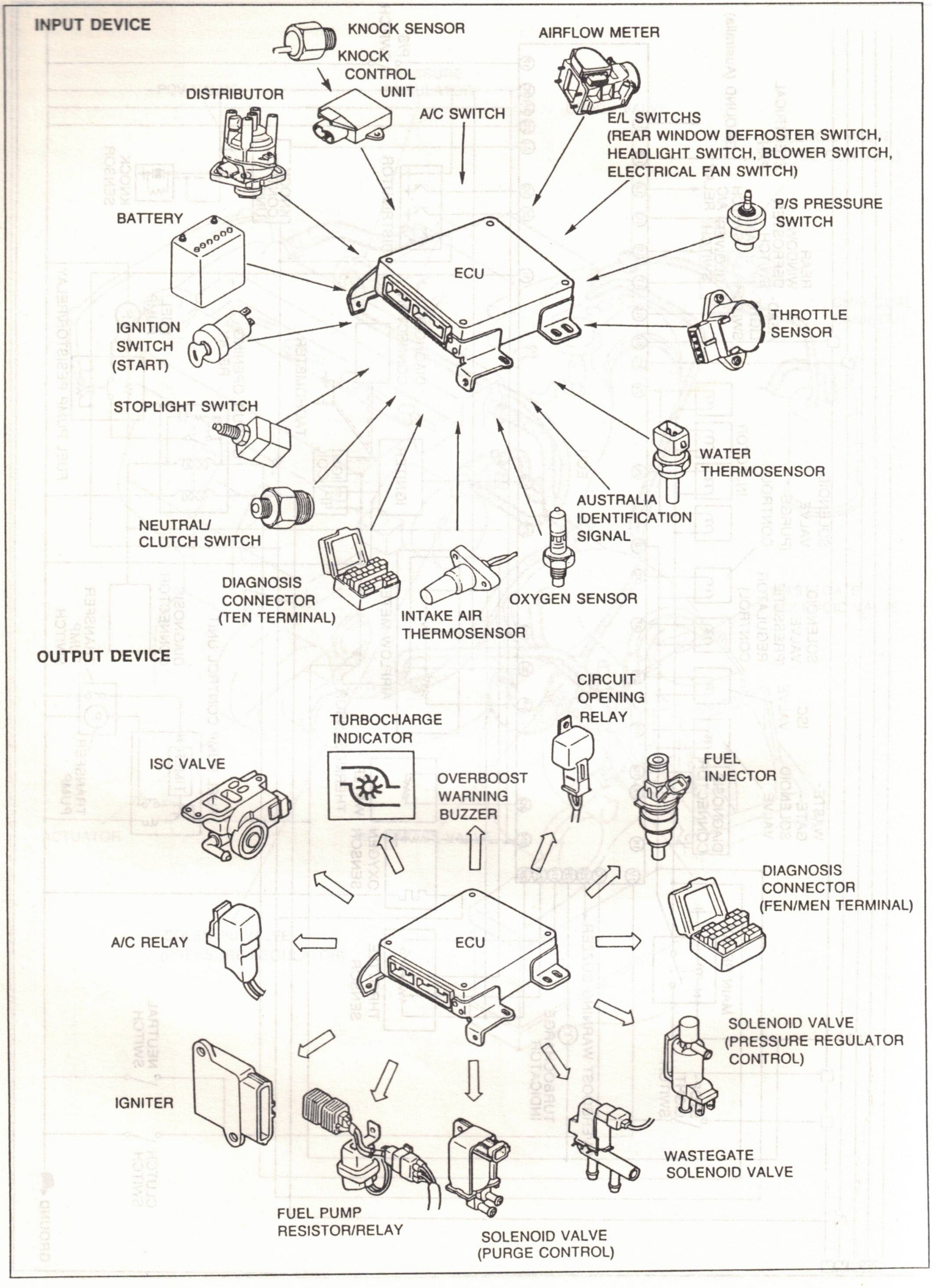

CHECK VALVE (TWO-WAY)
FUEL FILTER
FUEL PUMP
FUEL FILTER
FUEL FILTER
CHARCOAL CANISTER
FUEL VAPOR VALVE
TRANSFER PUMP
AIR CLEANER
AIRFLOW METER (WITH INTAKE THERMOSENSOR)
* TO ENGINE CONTROL UNIT
TURBOCHARGER
WASTEGATE ACTUATOR
KNOCK CONTROL UNIT
KNOCK SENSOR
OXYGEN SENSOR
SOLENOID VALVE (PURGE CONTROL)
AIR BYPASS VALVE
PRESSURE REGULATOR
PCV VALVE
FUEL FILTER
INJECTOR
WATER THERMOSENSOR
SOLENOID VALVE (PRESSURE REGULATOR)
CHECK VALVE
AIR VALVE
ISC VALVE
WASTEGATE SOLENOID VALVE
CATALYTIC CONVERTER
INTERCOOLER
DASHPOT
DISTRIBUTOR
Ne-SIGNAL *
G-SIGNAL *

VACUUM HOSE ROUTING DIAGRAM [BP TURBO]




P/S SWITCH
KNOCK CONTROL UNIT
KNOCK SENSOR
DISTRIBUTOR
ELECTRICAL FAN
GROUND (Australia)
REAR WINDOW DEFROSTER SWITCH
A/C SWITCH
A/C RELAY
BLOWER SWITCH
HEAD-LIGHT SWITCH
ECU
1P
2C
2A
2B
2J
2G
2E
1I
1M
1R
1J
1Q
1S
1T
1U
1A
1C
2V
2U
1G
2Y
1B
2X
2T
2Q
2D
2W
2P
1H
1D
1F
2O
1K
2N
1V
1O
2S
2R
1N
2M
2K
INJECTOR
SOLENOID VALVE (PURGE CONTROL)
SOLENOID VALVE (PRESSURE REGULATOR CONTROL)
ISC VALVE
WASTE-GATE SOLENOID VALVE
DIAGNOSIS CONNECTOR
MAIN RELAY
STOP-LIGHT SWITCH
OVERBOOST WARNING BUZZER
TURBOCHARGE INDICATOR
DIAGNOSIS CONNECTOR
TACHOMETER
IGNITER
IGN. COIL
AIRFLOW METER
WATER THERMOSENSOR
OXYGEN SENSOR
THROTTLE SENSOR
CIRCUIT OPENING RELAY
FUEL PUMP
P
FUEL PUMP RESISTOR/RELAY
DIAGNOSIS CONNECTOR
FUEL PUMP CONTROL UNIT
TIMER
TRANSFER PUMP SWITCH
P
TRANSFER PUMP
NEUTRAL SWITCH
CLUTCH SWITCH
GROUND
B
S
B
B
S

ECU RELATIONSHIP DIAGRAM [BP TURBO]



SPECIFICATIONS

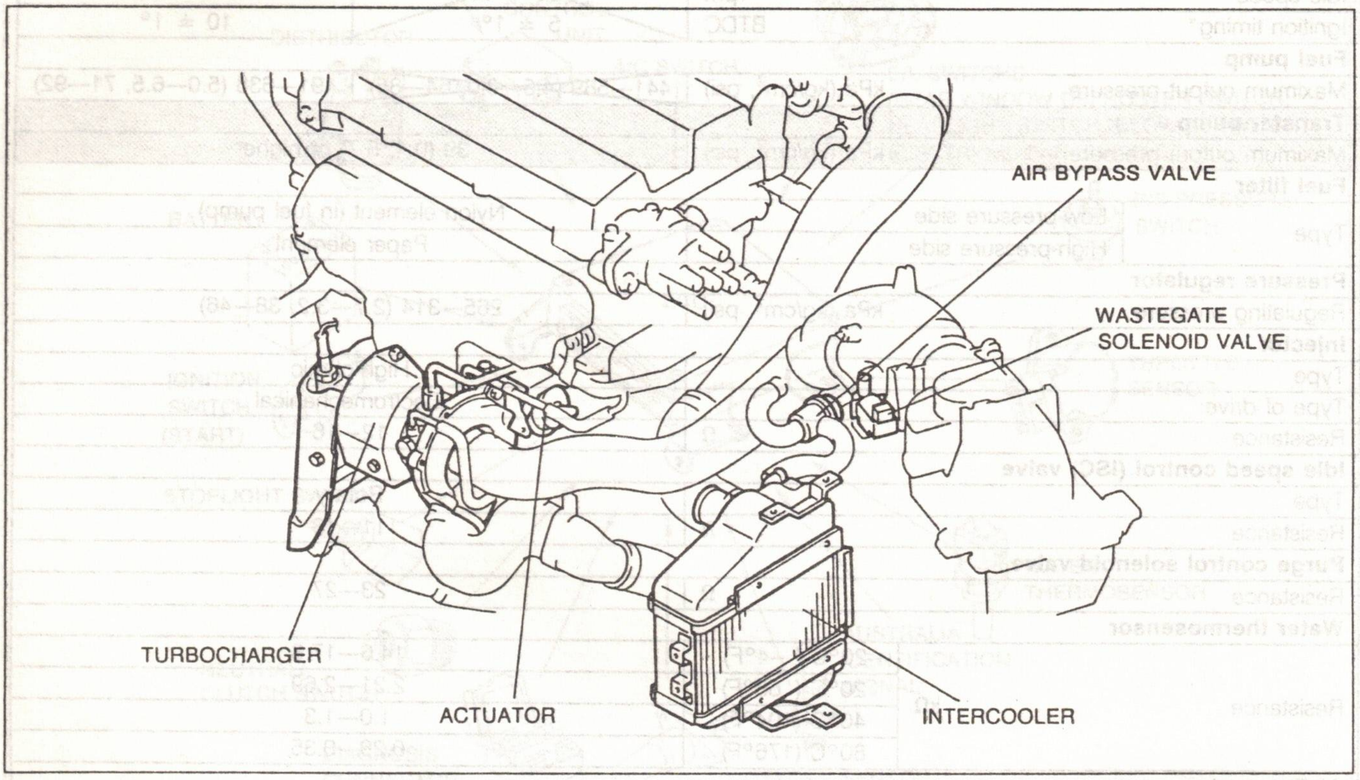
Item			Engine	~~BP SOHC~~	BP TURBO
Idle speed			rpm	~~750 ± 50~~	800 ± 50
Ignition timing*			BTDC	~~5 ± 1°~~	10 ± 1°
Fuel pump					
Maximum output pressure			kPa (kg/cm^2, psi)	~~441—589 (4.5—6.0, 64—85)~~	491—638 (5.0—6.5, 71—92)
Transfer pump					
Maximum output pressure			kPa (kg/cm^2, psi)	39 (0.4, 5.7) or higher	
Fuel filter					
Type	Low-pressure side			Nylon element (in fuel pump)	
	High-pressure side			Paper element	
Pressure regulator					
Regulating pressure			kPa (kg/cm^2, psi)	265—314 (2.7—3.2, 38—46)	
Injector					
Type				High-ohmic	
Type of drive				Electromechanical	
Resistance			Ω	12—16	
Idle speed control (ISC) valve					
Type				Rotary	
Resistance			Ω	11—13	
Purge control solenoid valve					
Resistance			Ω	23—27	
Water thermosensor					
Resistance		−20°C (−4°F)	kΩ	14.6—17.8	
		20°C (68°F)		2.21—2.69	
		40°C (104°F)		1.0—1.3	
		80°C (176°F)		0.29—0.35	
Airflow meter					
Resistance	$E_2 \leftrightarrow V_s$	Fully closed	Ω	200—600	
		Fully open		20—1,200	
	$E_2 \leftrightarrow V_c$			200—400	
	$E_2 \leftrightarrow THA_A$ (Intake air thermosensor)	−20°C (−4°F)		13,600—18,400	
		20°C (68°F)		2,210—2,690	
		60°C (140°F)		493—667	
	$E_1 \leftrightarrow F_c$	Fully closed		∞	
		Fully open		0	
Oxygen sensor (Ceramic heater coil)					
Resistance			Ω	—	Approx. 6 [at 20°C (68°F)]
Fuel tank					
Capacity			liters (US gal, Imp gal)	60 (15.9, 13.2)	
Air cleaner					
Element type				Oil permeated	
Fuel					
Specification				~~Unleaded regular (RON 91 or higher)~~	Australia...Unleaded regular (RON 91 or higher)

* TEN terminal of diagnosis connector grounded.
The ▨mark indicates newly fitted parts.

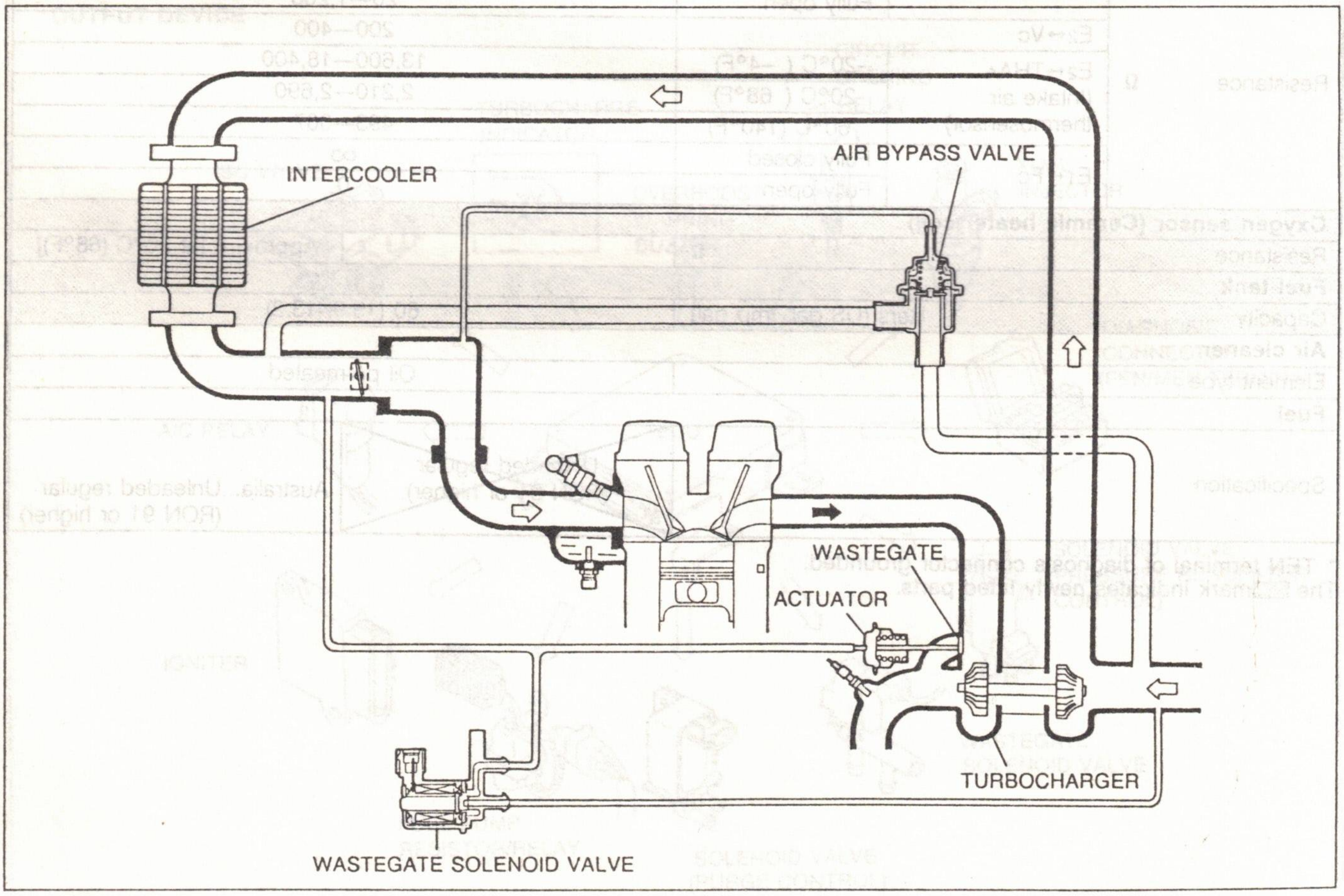
TURBOCHARGER CONTROL (BP TURBO)

OUTLINE

- The air-to-air intercooler is used to lower intake air temperature and to improve engine performance.
- With the addition of the wastegate control system, engine torque at higher rpm is also increased.



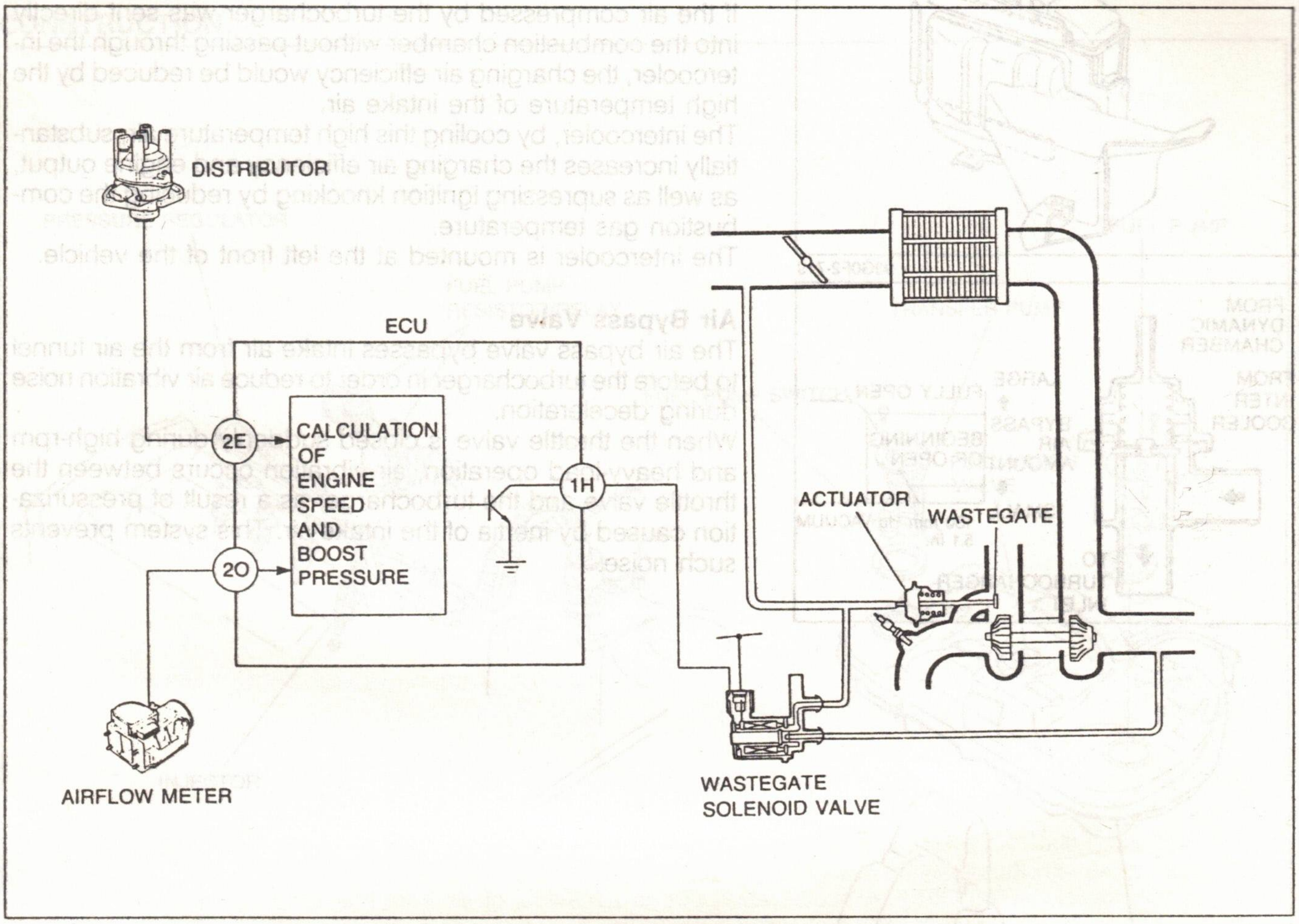
SYSTEM DIAGRAM



WASTEGATE CONTROL

The engine control unit controls the wastegate solenoid valve to give higher boost to the engine in the higher rpm range, increasing engine torque and power.

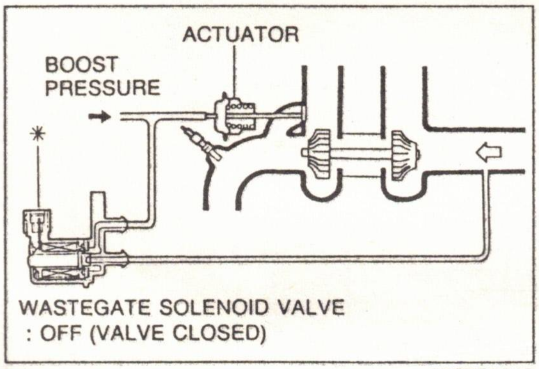
System Diagram



Operation

Engine speed below 5,300 rpm

The wastegate solenoid valve is OFF. Boost pressure is applied directly to the actuator and the wastegate opens when the boost pressure exceeds **49 kPa (0.5 kg/cm^2, 7.1 psi)**.



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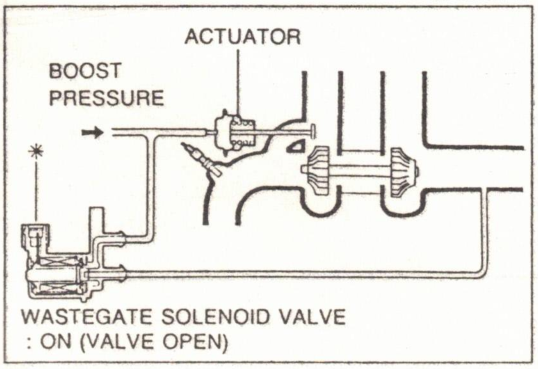
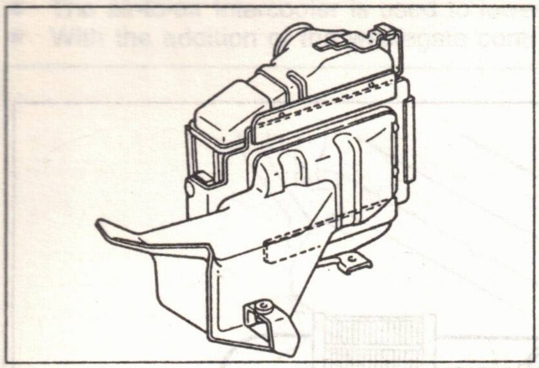
Engine speed above 5,300 rpm

The wastegate solenoid valve is ON. Some boost pressure is bypassed to the intake manifold, limiting the opening of the wastegate to increase boost pressure and improve engine performance.





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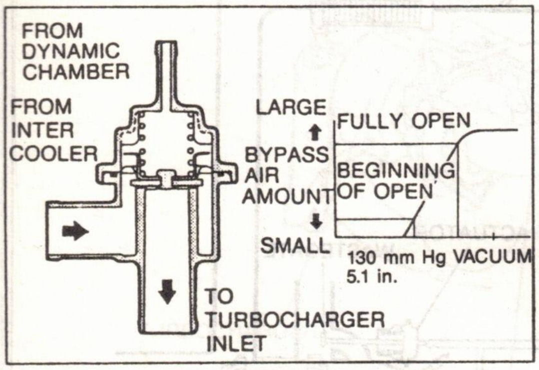


Intercooler

The air-to-air intercooler utilizes fresh air flow through the intercooler core to reduce the intake air temperature.

If the air compressed by the turbocharger was sent directly into the combustion chamber without passing through the intercooler, the charging air efficiency would be reduced by the high temperature of the intake air.

The intercooler, by cooling this high temperature air, substantially increases the charging air efficiency and engine output, as well as supressing ignition knocking by reducing the combustion gas temperature.

The intercooler is mounted at the left front of the vehicle.

Air Bypass Valve

The air bypass valve bypasses intake air from the air funnel to before the turbocharger in order to reduce air vibration noise during deceleration.

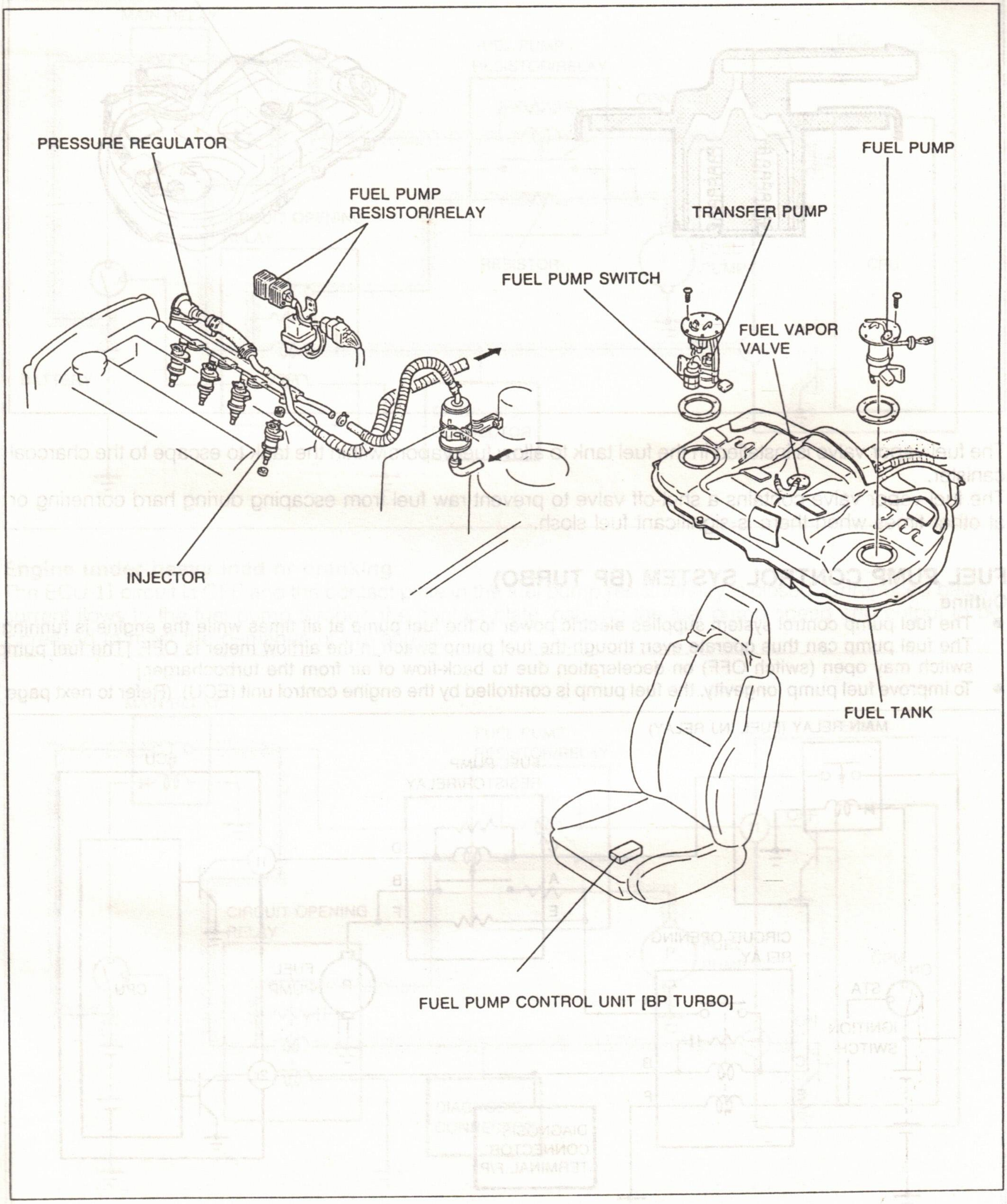
When the throttle valve is closed suddenly during high-rpm and heavy-load operation, air vibration occurs between the throttle valve and the turbocharger as a result of pressurization caused by inertia of the intake air. This system prevents such noise.

FUEL SYSTEM

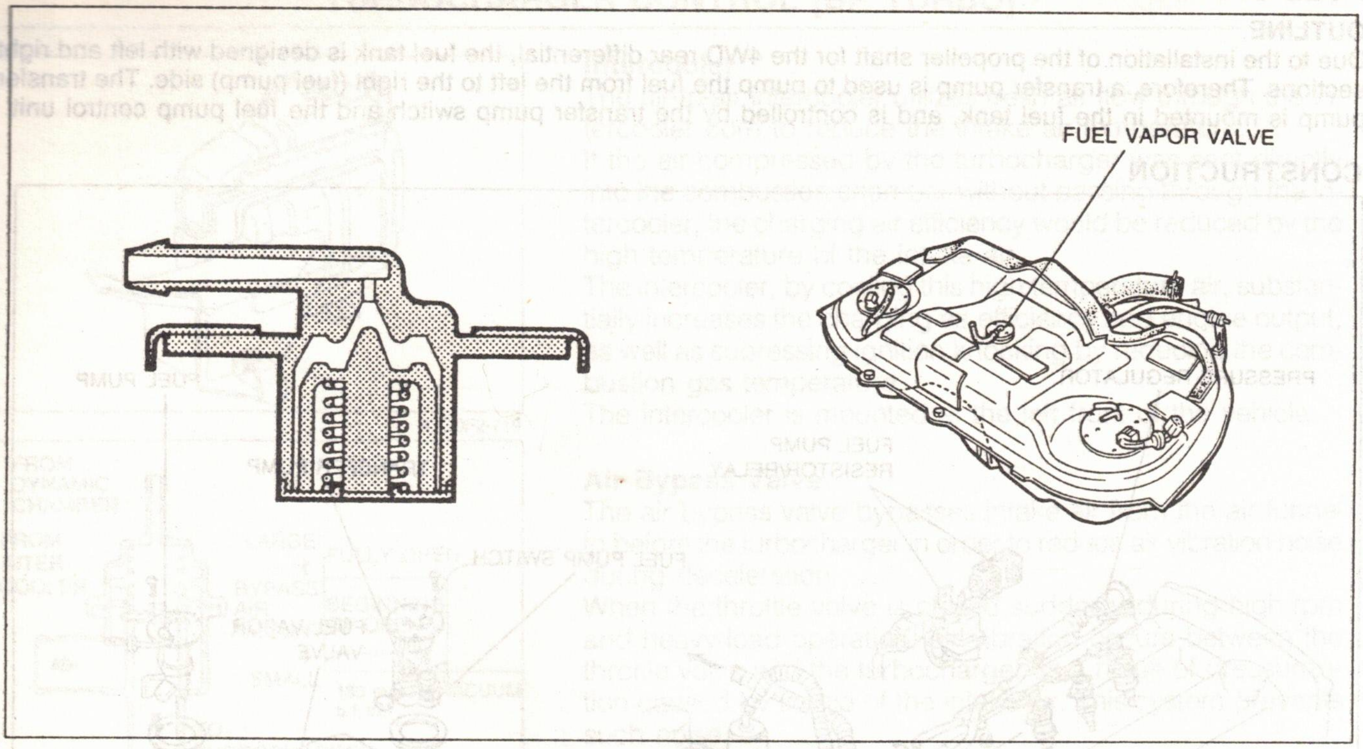
OUTLINE

Due to the installation of the propeller shaft for the 4WD rear differential, the fuel tank is designed with left and right sections. Therefore, a transfer pump is used to pump the fuel from the left to the right (fuel pump) side. The transfer pump is mounted in the fuel tank, and is controlled by the transfer pump switch and the fuel pump control unit.

CONSTRUCTION



FUEL VAPOR VALVE



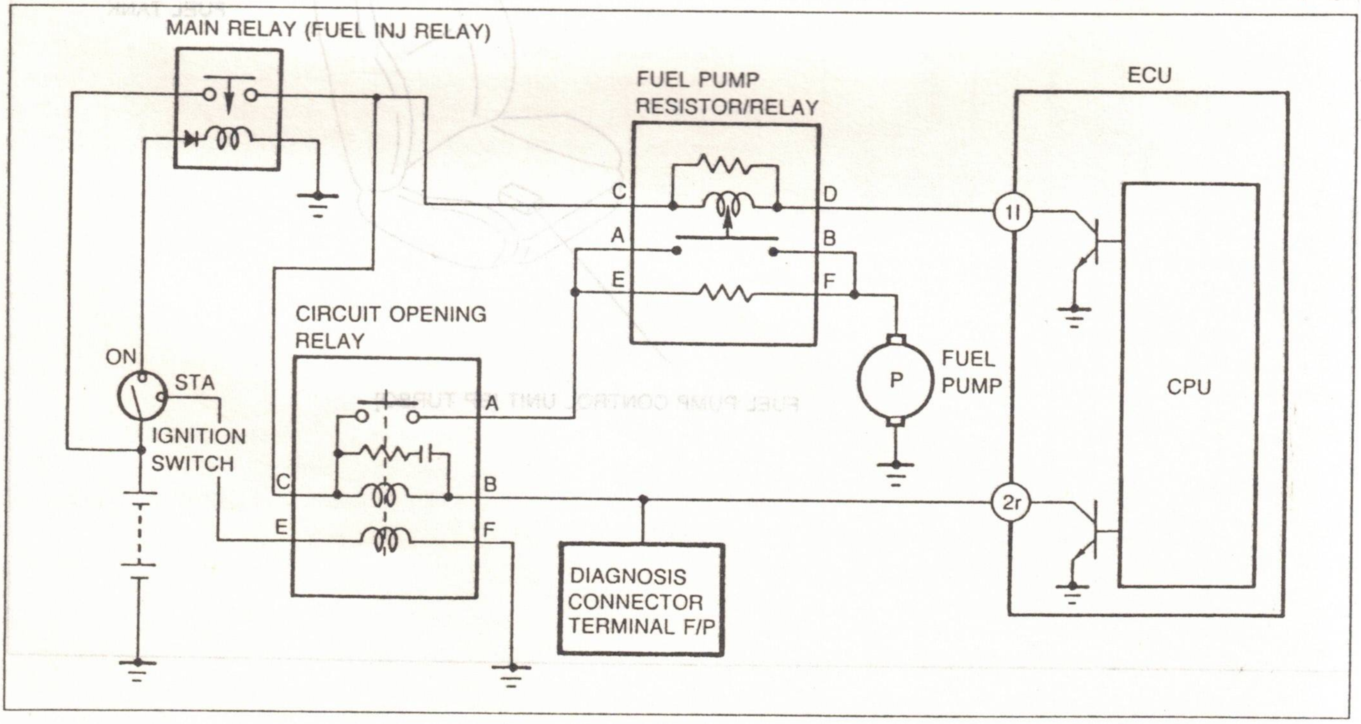
The fuel vapor valve is installed in the fuel tank to allow fuel vapors within the tank to escape to the charcoal canister.

The fuel vapor valve contains a shut-off valve to prevent raw fuel from escaping during hard cornering or at other times when there is significant fuel slosh.

FUEL PUMP CONTROL SYSTEM (BP TURBO)

Outline

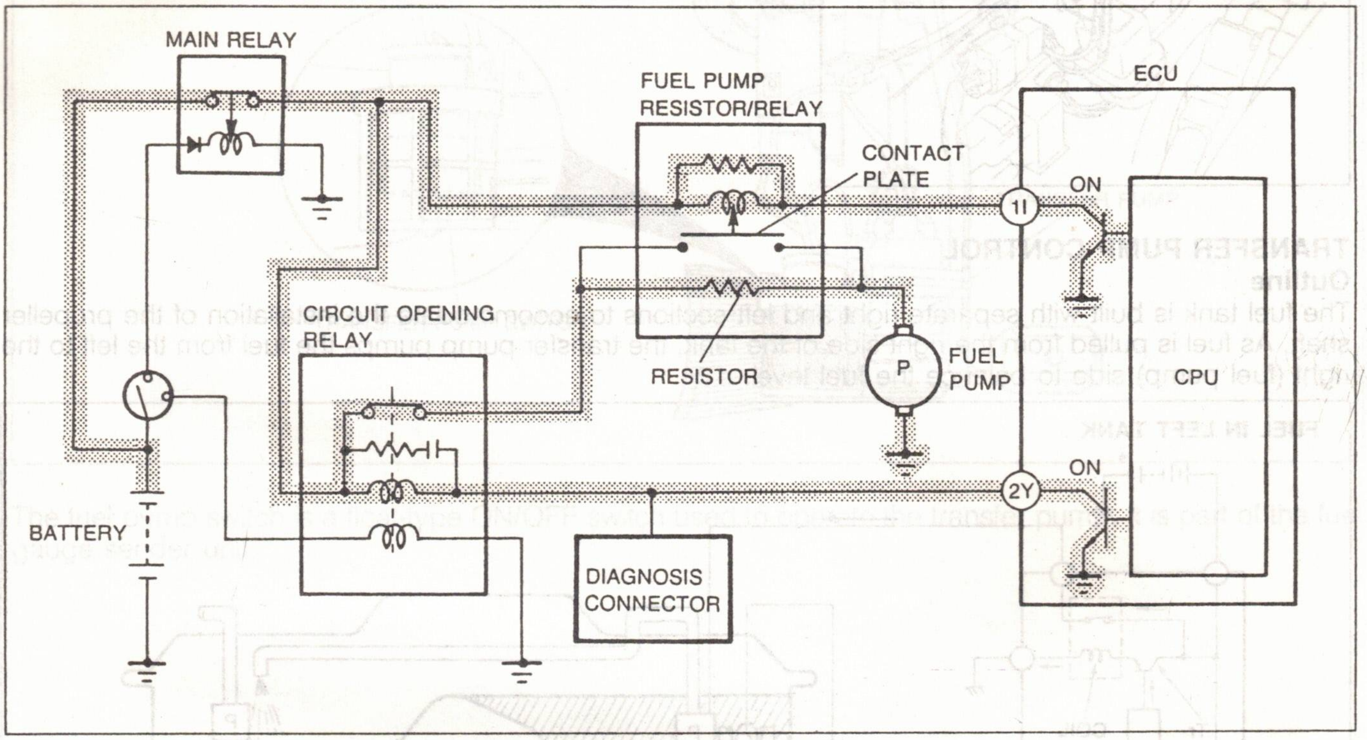
- The fuel pump control system supplies electric power to the fuel pump at all times while the engine is running. The fuel pump can thus operate even though the fuel pump switch in the airflow meter is OFF. [The fuel pump switch may open (switch OFF) on deceleration due to back-flow of air from the turbocharger.]
- To improve fuel pump longevity, the fuel pump is controlled by the engine control unit (ECU). (Refer to next page.)



Two-stage fuel pump operation

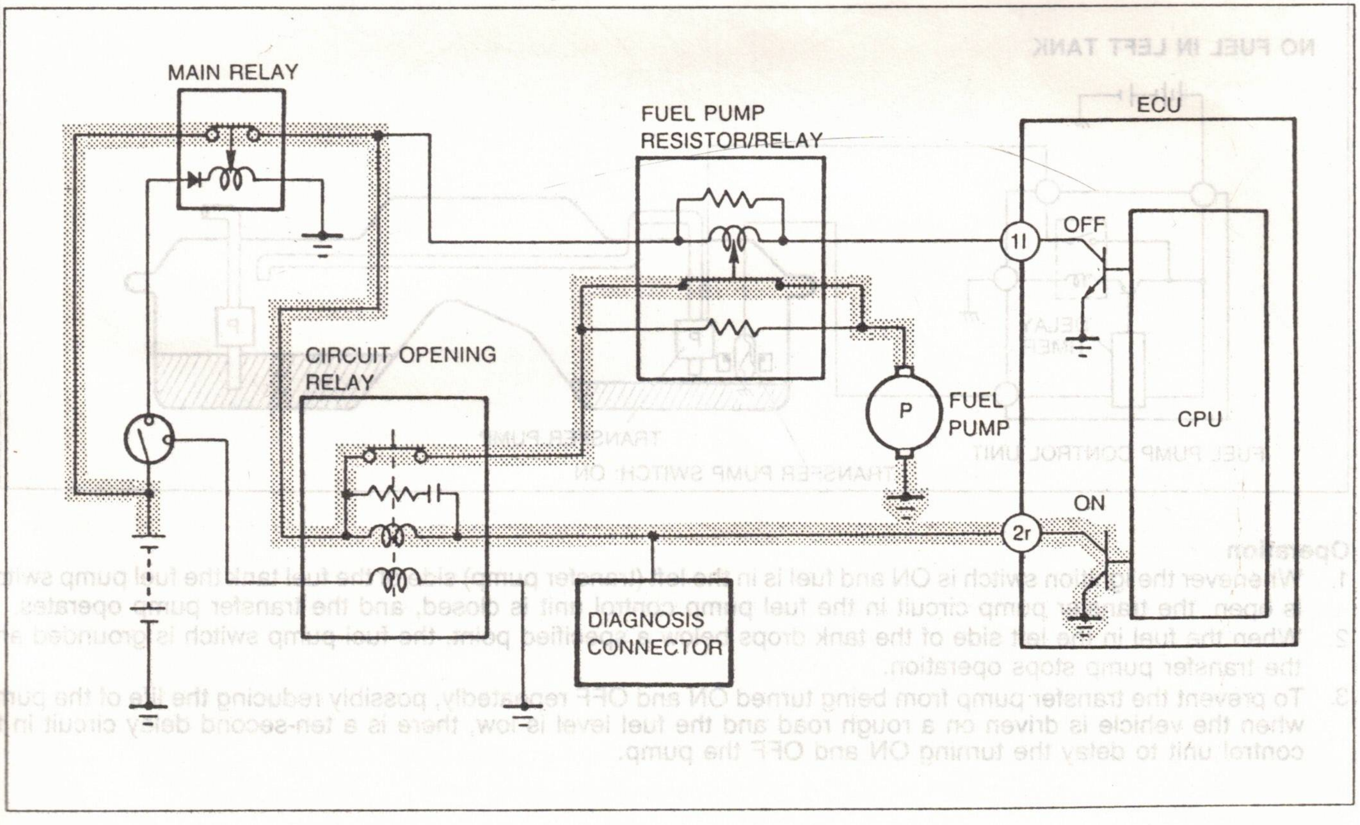
Engine running (Except heavy load or cranking)

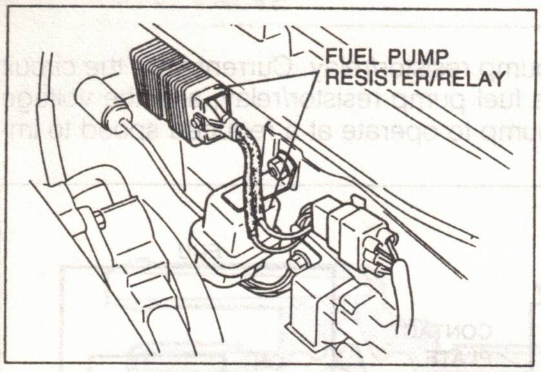
The ECU 1I circuit is ON, opening the contact plate in the fuel pump resistor/relay. Current from the circuit opening relay to the fuel pump flows through the resistor in the fuel pump resistor/relay, and the voltage to the fuel pump is reduced to **approx. 10V**, causing the fuel pump to operate at a reduced speed to improve fuel pump longevity.



Engine under heavy load or cranking

The ECU 1I circuit is OFF and the contact plate in the fuel pump resistor/relay is closed. Unreduced battery current flows to the fuel pump through the contact plate, causing the fuel pump speed and output to be increased to meet the demands of the engine.





FUEL PUMP RESISTOR/RELAY [BP TURBO]

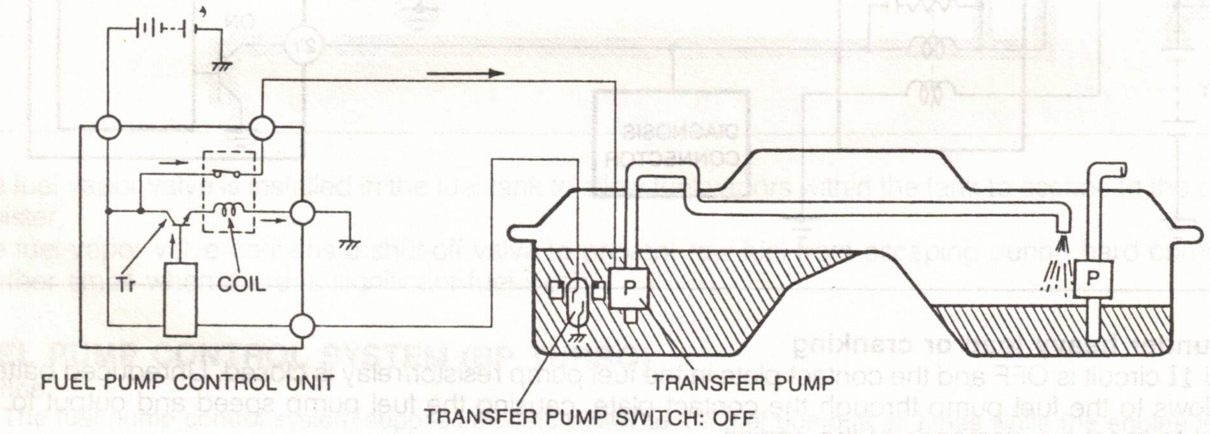
The fuel pump resistor/relay supplies battery voltage to the fuel pump when the ECU 1I circuit is OFF, and **approx. 10V** when the ECU 1I circuit is ON. It is mounted on the firewall.

TRANSFER PUMP CONTROL

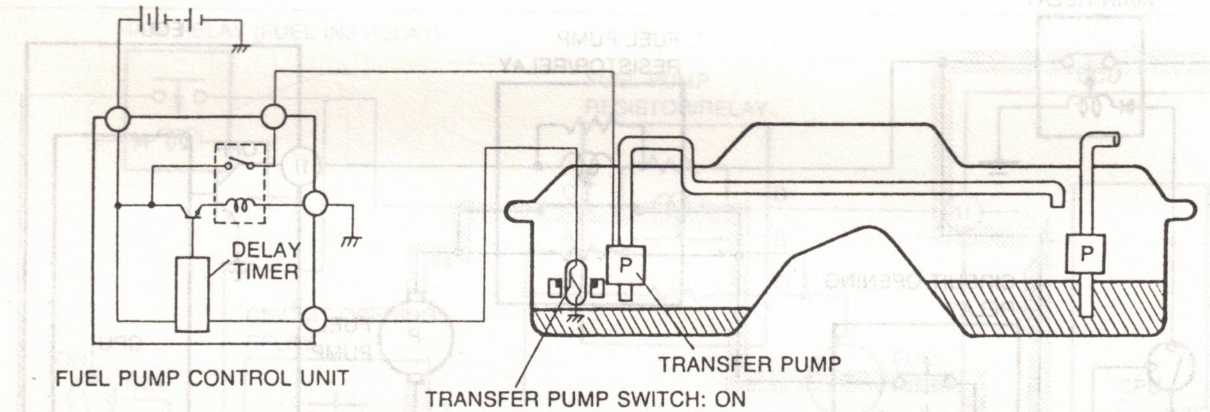
Outline

The fuel tank is built with separate right and left sections to accommodate the installation of the propeller shaft. As fuel is pulled from the right side of the tank, the transfer pump pumps the fuel from the left to the right (fuel pump) side to balance the fuel level.

FUEL IN LEFT TANK



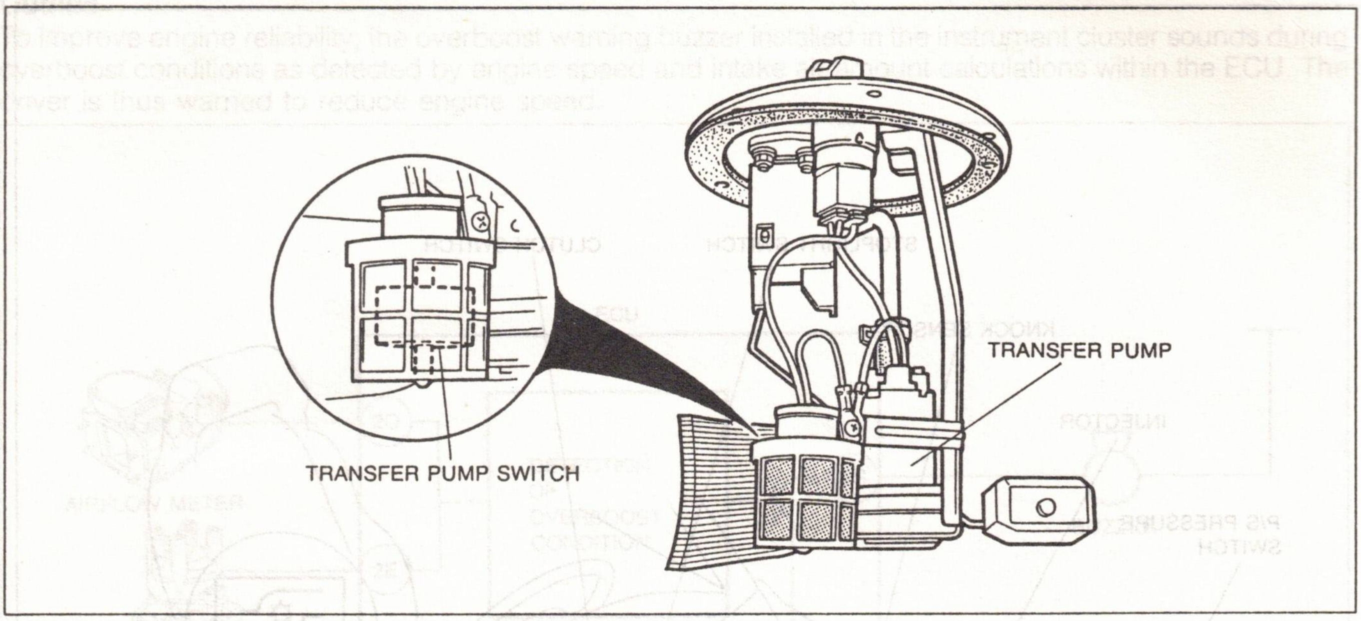
NO FUEL IN LEFT TANK



Operation

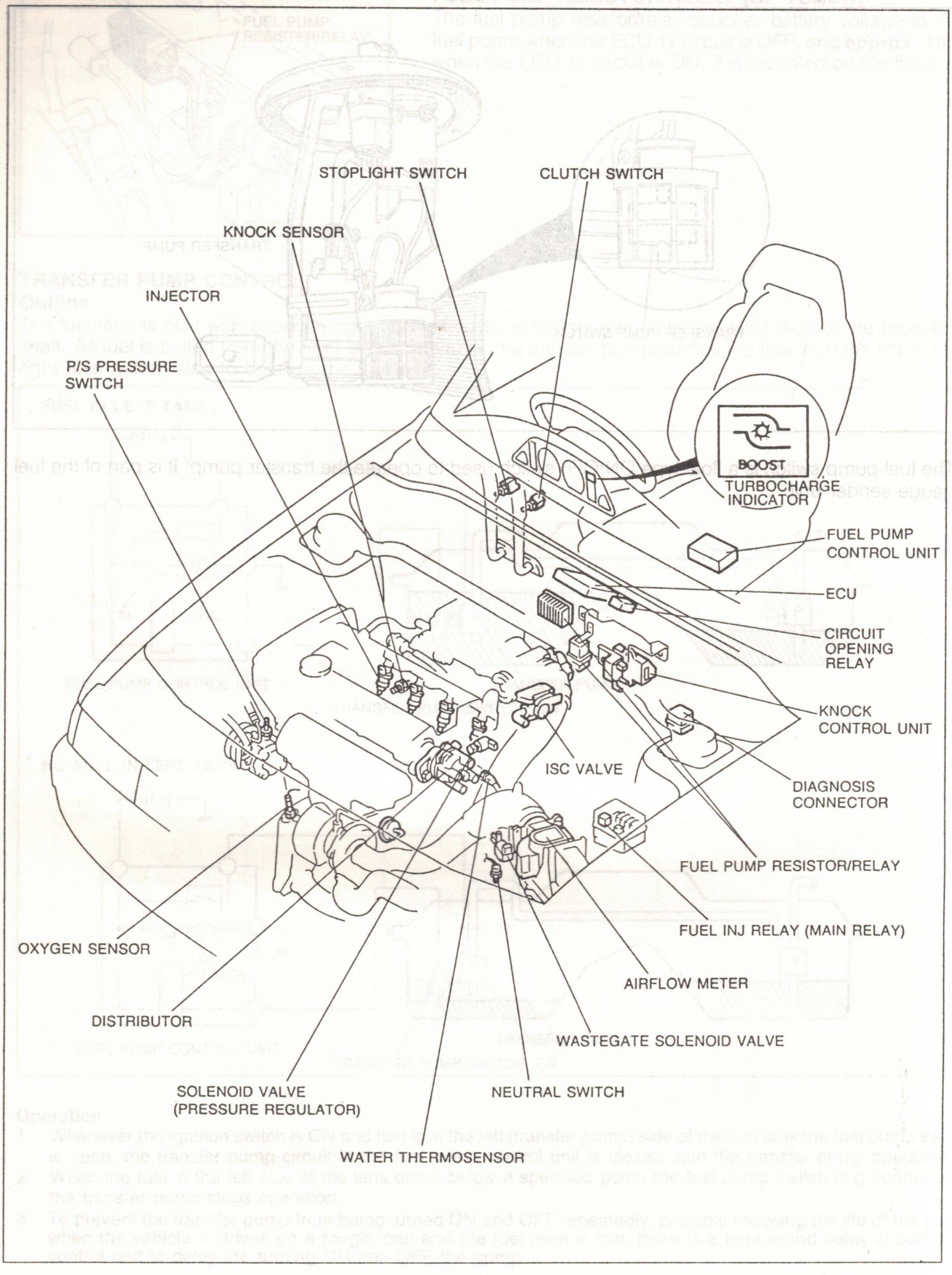
1. Whenever the ignition switch is ON and fuel is in the left (transfer pump) side of the fuel tank the fuel pump switch is open, the transfer pump circuit in the fuel pump control unit is closed, and the transfer pump operates.
2. When the fuel in the left side of the tank drops below a specified point, the fuel pump switch is grounded and the transfer pump stops operation.
3. To prevent the transfer pump from being turned ON and OFF repeatedly, possibly reducing the life of the pump, when the vehicle is driven on a rough road and the fuel level is low, there is a ten-second delay circuit in the control unit to delay the turning ON and OFF the pump.

Transfer Pump Switch



The fuel pump switch is a float-type ON/OFF switch used to operate the transfer pump. It is part of the fuel gauge sender unit.

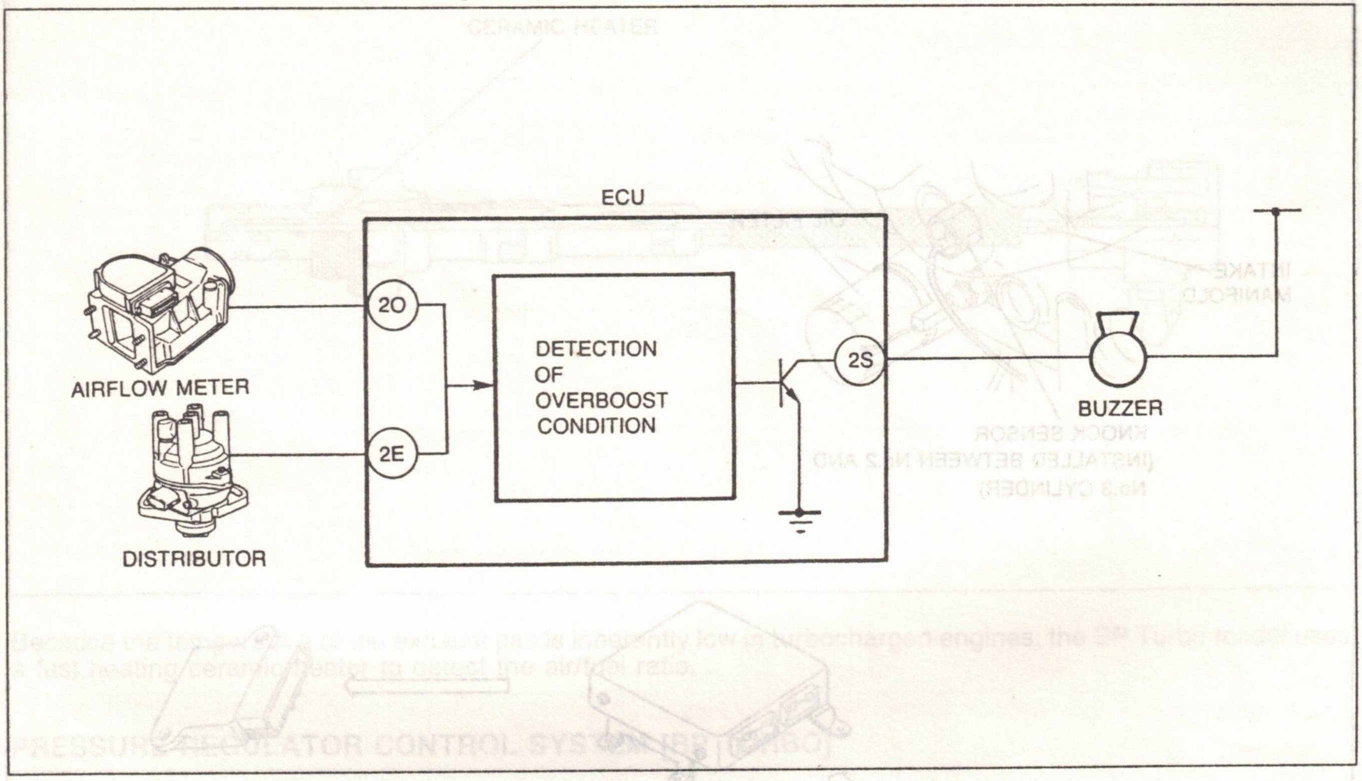
STRUCTURAL VIEW



OVERBOOST WARNING BUZZER [BP TURBO]

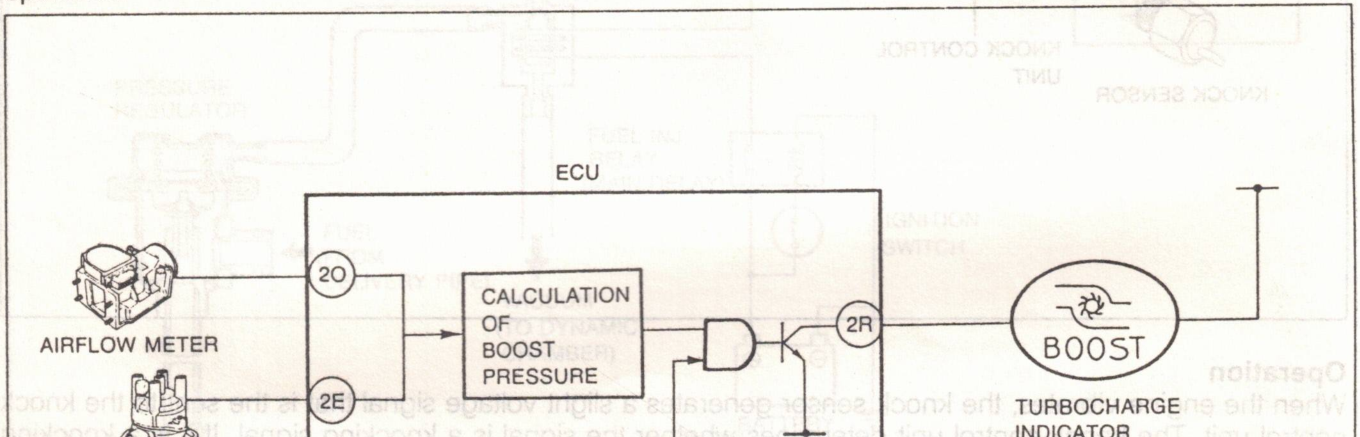
Outline

To improve engine reliability, the overboost warning buzzer installed in the instrument cluster sounds during overboost conditions as detected by engine speed and intake air amount calculations within the ECU. The driver is thus warned to reduce engine speed.



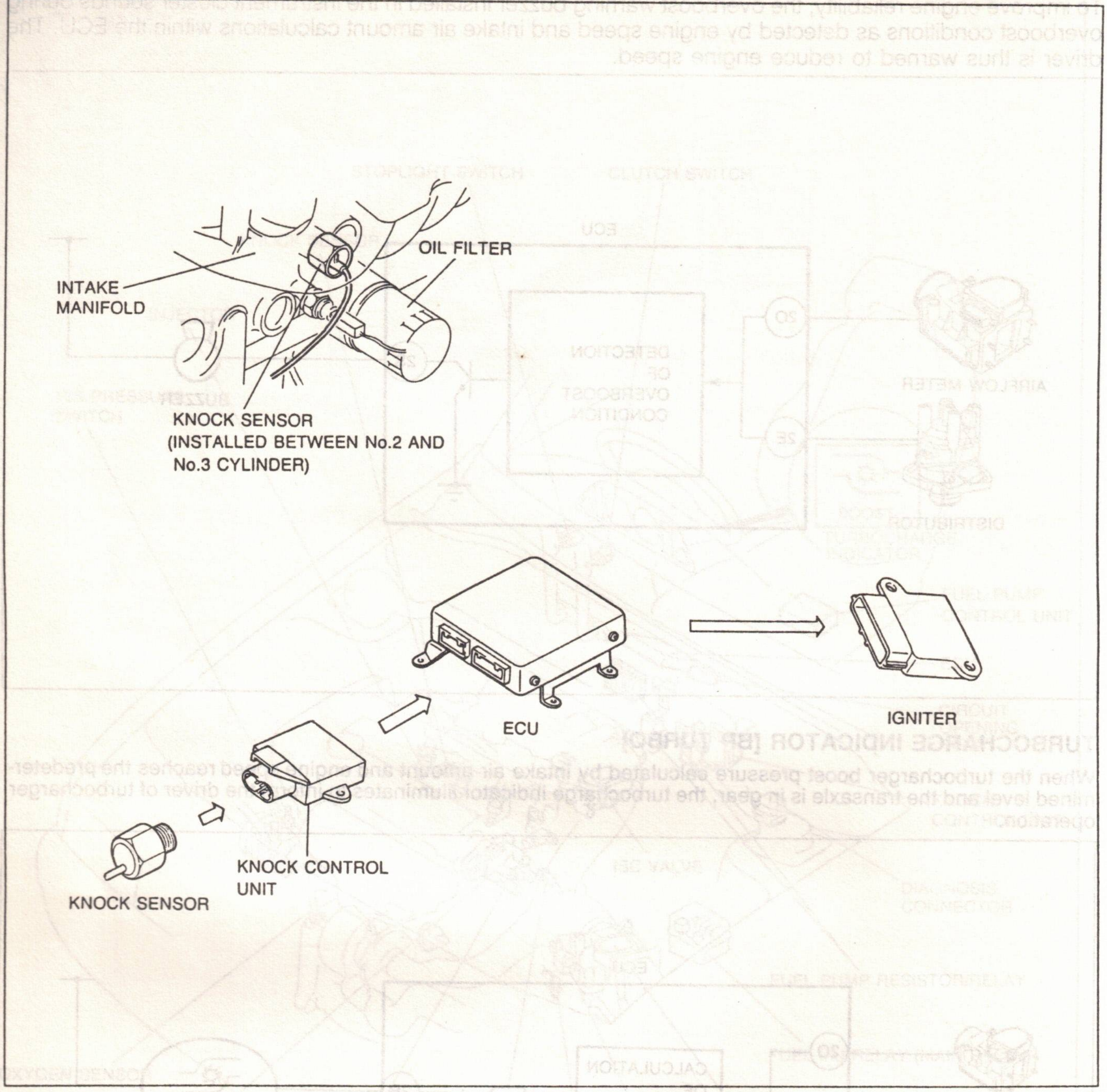
TURBOCHARGE INDICATOR [BP TURBO]

When the turbocharger boost pressure calculated by intake air amount and engine speed reaches the predetermined level and the transaxle is in gear, the turbocharge indicator illuminates to inform the driver of turbocharger operation.



KNOCK CONTROL SYSTEM [BP TURBO]

This system retards the ignition timing when engine knocking occurs because of usage of low octane fuel, etc.



Operation

When the engine vibrates, the knock sensor generates a slight voltage signal that is the sent to the knock control unit. The knock control unit determines whether the signal is a knocking signal. If it is a knocking signal, the ignition spark is retarded according to the intensity of the knock to a maximum of 4°.

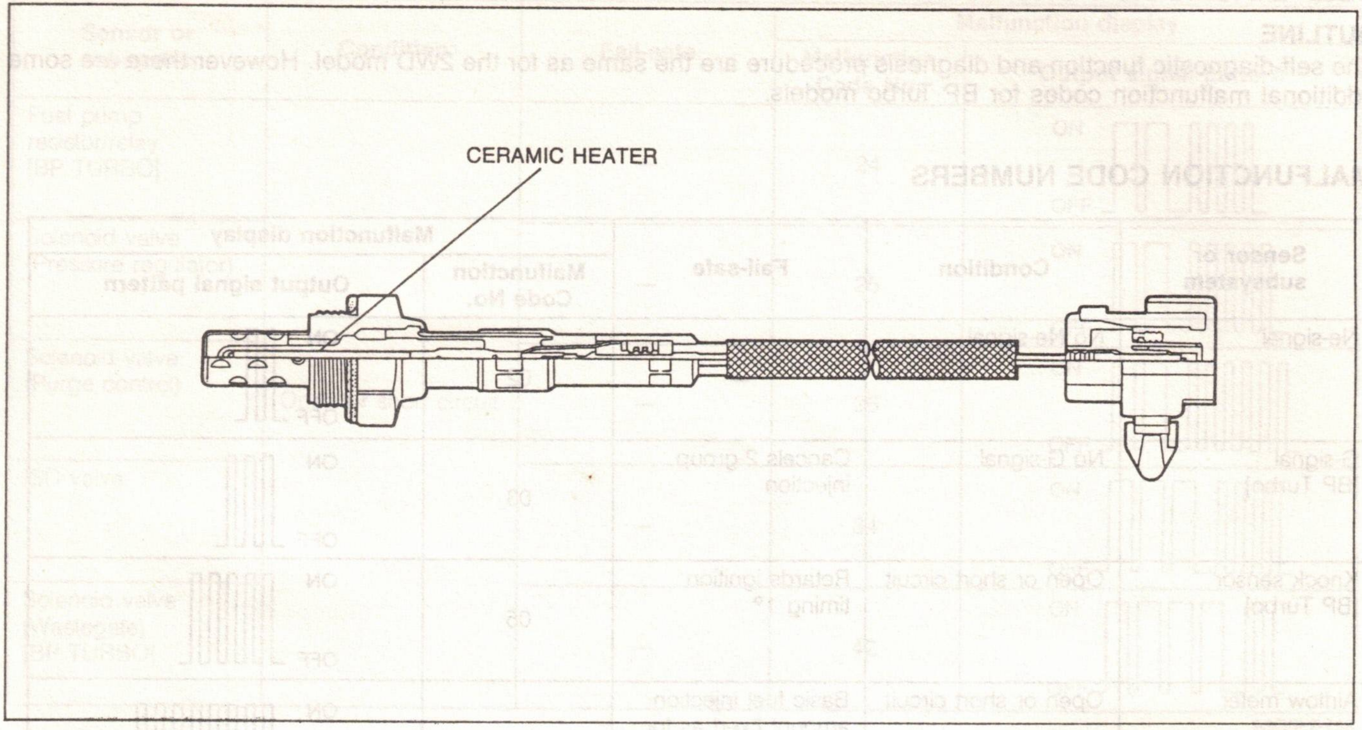
Inhibition of spark retardation

In order to improve drivability and fuel economy, the ECU inhibits the above spark retardation when the engine load is light, the coolant temperature is below 0°C (32°F), the engine is cranking during engine test conditions.

Note

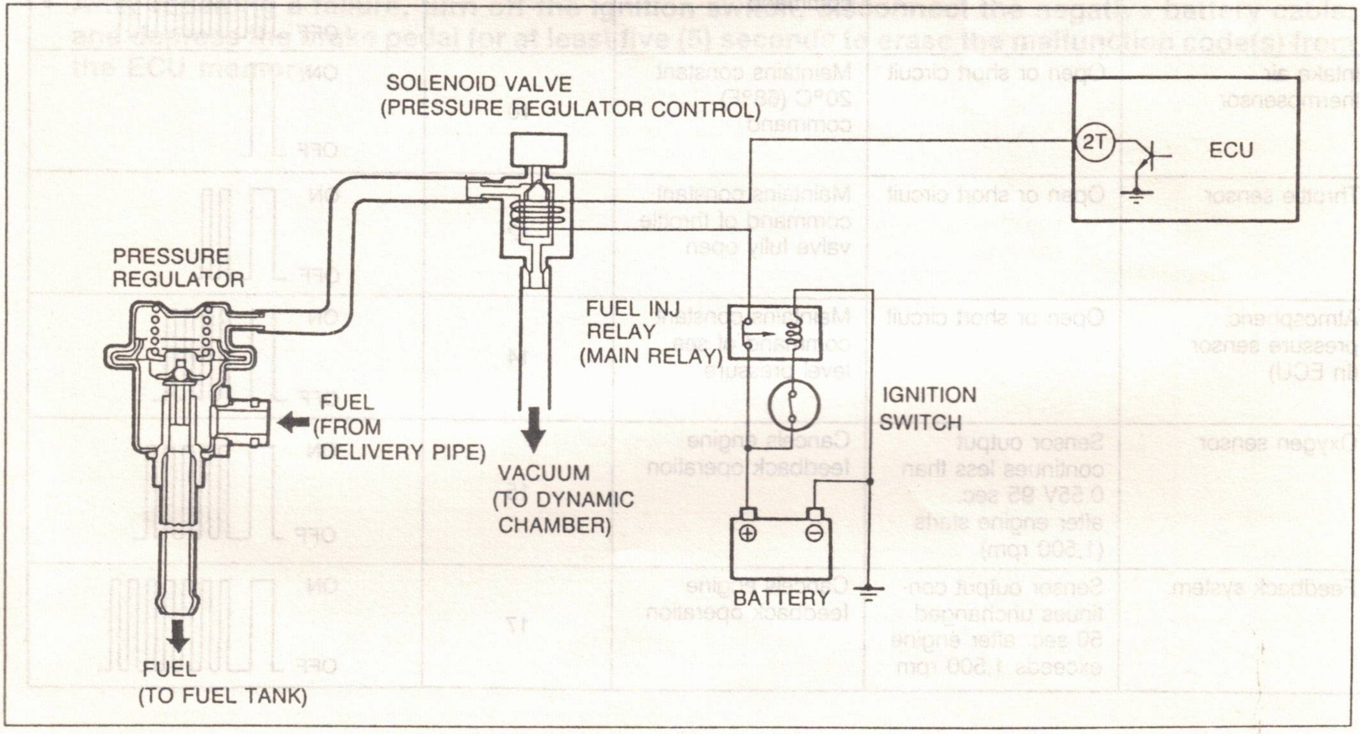
- **The knock sensor and knock control unit cannot be inspected individually.
When a malfunction code number 05 is indicated, replace the knock control unit or sensor only after inspecting the related wiring and connectors.**

OXYGEN SENSOR [BP TURBO]



Because the temperature of the exhaust gas is inherently low in turbocharged engines, the BP Turbo model uses a fast heating ceramic heater to detect the air/fuel ratio.

PRESSURE REGULATOR CONTROL SYSTEM [BP TURBO]



To prevent percolation of the fuel during hot restart idle, vacuum to the pressure regulator is cut for **180 sec.**, and the fuel injection pressure is increased to slightly more than **284 kPa (2.90 kg/cm^2, 41.2 psi)**.

Operating condition

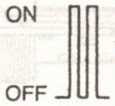
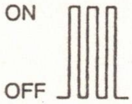
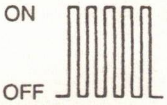
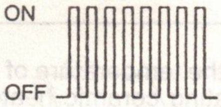
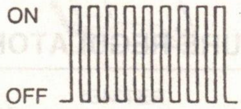
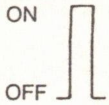
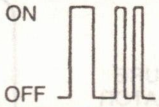
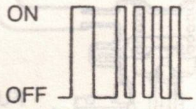
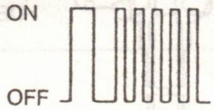
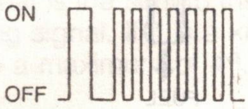
- Coolant temperature: Above 90°C (194°F)
- Intake air temperature: Above 58°C (136°F)
- No-load condition

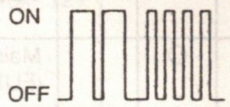
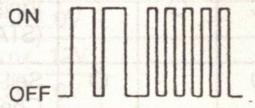
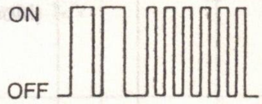
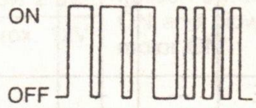
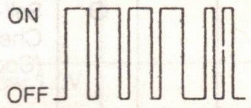
SELF-DIAGNOSIS FUNCTION

OUTLINE

The self-diagnostic function and diagnosis procedure are the same as for the 2WD model. However there are some additional malfunction codes for BP Turbo models.

MALFUNCTION CODE NUMBERS

Sensor or subsystem	Condition	Fail-safe	Malfunction display	
			Malfunction Code No.	Output signal pattern
Ne-signal	No Ne-signal	—	02	
G-signal [BP Turbo]	No G-signal	Cancels 2-group injection	03	
Knock sensor [BP Turbo]	Open or short circuit	Retards ignition timing 1°	05	
Airflow meter	Open or short circuit	Basic fuel injection amount fixed as for 2 driving modes (1) Idle switch: ON (2) Idle switch: OFF	08	
Water thermosensor	Open or short circuit	Maintains constant 20°C (68°F) command	09	
Intake air thermosensor	Open or short circuit	Maintains constant 20°C (68°F) command	10	
Throttle sensor	Open or short circuit	Maintains constant command of throttle valve fully open	12	
Atmospheric pressure sensor (In ECU)	Open or short circuit	Maintains constant command of sea level pressure	14	
Oxygen sensor	Sensor output continues less than 0.55V 95 sec. after engine starts (1,500 rpm)	Cancels engine feedback operation	15	
Feedback system	Sensor output continues unchanged 50 sec. after engine exceeds 1,500 rpm	Cancels engine feedback operation	17	

Sensor or subsystem	Condition	Fail-safe	Malfunction display	
			Malfunction Code No.	Output signal pattern
Fuel pump resistor/relay [BP TURBO]	Open or short circuit	—	24	
Solenoid valve (Pressure regulator)		—	25	
Solenoid valve (Purge control)		—	26	
ISC valve		—	34	
Solenoid valve (Wastegate) [BP TURBO]		—	42	

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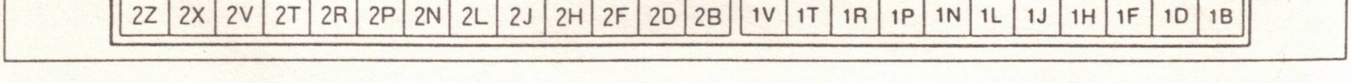
Caution

- **If there is more than one failure present, the code numbers will be indicated in numerical order, lowest number first.**
- **After repairing a failure, turn off the ignition switch, disconnect the negative battery cable, and depress the brake pedal for at least five (5) seconds to erase the malfunction code(s) from the ECU memory.**

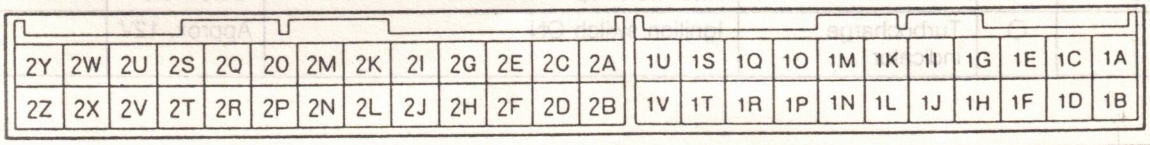
Terminal voltage [BP TURBO]

Terminal	Input	Output	Connected to	Test condition		Correct voltage	Remark
1A	—	—	Battery	Constant		Approx. 12V	For backup
1B	○		Main relay (FUEL INJ relay)	Ignition switch	OFF	Approx. 0V	—
					ON	Approx. 12V	
1C	○		Ignition switch (START)	While cranking		Approx. 10V	—
				Ignition switch ON		Approx. 0V	
1D		○	Self-Diagnosis Checker (Monitor lamp)	Test switch at "SELF-TEST" Lamp illuminated for 3 sec. after ignition switch OFF→ON		Approx. 5V	With Self-Diagnosis Checker and System Selector
				Lamp not illuminated after 3 sec.		Approx. 12V	
				Test switch at "O2 MONITOR" at idle Monitor lamp illuminated		Approx. 5V	
				Test switch at "O2 MONITOR" at idle Monitor lamp not illuminated		Approx. 12V	
1E	—	—	—	—		—	—
1F		○	Self-Diagnosis Checker (Code Number)	Buzzer sounded for 3 sec. after ignition switch OFF→ON		Below 2.5V	• With Self-Diagnosis Checker and System Selector • With System Selector test switch at "SELF-TEST"
				Buzzer not sounded after 3 sec.		Approx. 12V	
				Buzzer sounded		Below 2.5V	
				Buzzer not sounded		Approx. 12V	
1G		○	Igniter	Ignition switch ON		Approx. 0V	
				Idle		Approx. 0.2V	
1H		○	Solenoid valve (Wastegate)	Engine speed below 5,300 rpm		Approx. 12V	—
				Engine speed above 5,300 rpm		Below 1.5V	
1I		○	Fuel pump resistor/relay	While cranking		Approx. 10V	—
				Idle		Below 1.5V	
1J		○	A/C relay	Ignition switch ON		Approx. 12V	—
				A/C switch ON at idle		Below 2.5V	
				A/C switch OFF at idle		Approx. 12V	
1K	○		Diagnosis connector (TEN terminal)	System Selector test switch at "O2 MONITOR"		Approx. 12V	—
				System Selector test switch at "SELF-TEST"		Below 1.0V	
1L	—	—	—	—		—	—
1M	○		Ground (Australia)	Constant		Below 1.0V	Not used (Except Australia)



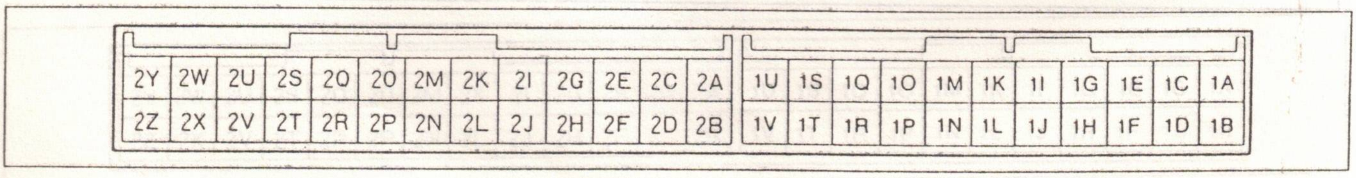
2Y	2W	2U	2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A	1U	1S	1Q	1O	1M	1K	1I	1G	1E	1C	1A
2Z	2X	2V	2T	2R	2P	2N	2L	2J	2H	2F	2D	2B	1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B

Terminal	Input	Output	Connected to	Test condition	Correct voltage	Remark
1N	○		Throttle sensor (Idle switch)	Accelerator pedal released	Below 1.0V	Ignition switch ON
				Accelerator pedal depressed	Approx. 12V	
1O	○		Stoplight switch	Brake pedal released	Below 1.0V	—
1P	○		P/S pressure switch	Ignition switch ON	Approx. 12V	—
				P/S ON at idle	Below 1.0V	
				P/S OFF at idle	Approx. 12V	
1Q	○		A/C switch	A/C switch ON	Below 2.5V	Ignition switch ON and blower motor ON
				A/C switch OFF	Approx. 12V	
1R	○		Electric fan switch	Fan operating (Engine coolant temperature over 91°C (196°F) or diagnosis connector terminal TFA grounded)	Below 1.0V	—
				Fan not operating (Idle)	Approx. 12V	
1S	○		Blower control switch	Blower control switch OFF or 1st position	Approx. 12V	Ignition switch ON
				Blower control switch 2nd or higher position	Below 1.0V	
1T	○		Rear window defroster switch	Rear window defroster switch OFF	Below 1.0V	Ignition switch ON
				Rear window defroster switch ON	Approx. 12V	
1U	○		Headlight switch	Headlights ON	Approx. 12V	—
				Headlights OFF	Below 1.0V	
1V	○		Neutral/Clutch switches	Neutral position or clutch pedal depressed	Below 1.0V	
				Others	Approx. 12V	



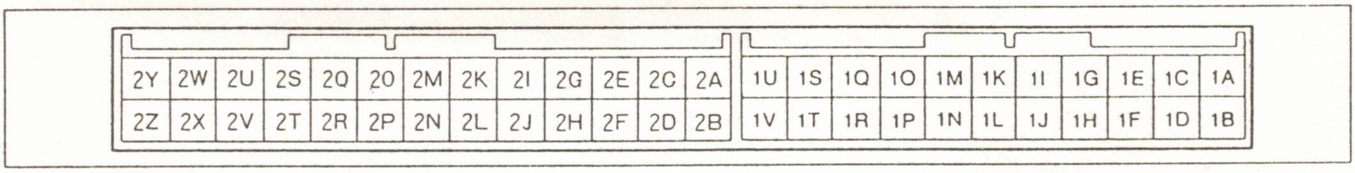
2Y	2W	2U	2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A	1U	1S	1Q	1O	1M	1K	1I	1G	1E	1C	1A
2Z	2X	2V	2T	2R	2P	2N	2L	2J	2H	2F	2D	2B	1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B

Terminal	Input	Output	Connected to	Test condition	Correct voltage	Remark
2A	—	—	Ground (Injector)	Constant	0V	—
2B	—	—	Ground (Output)	Constant	0V	—
2C	—	—	Ground (CPU)	Constant	0V	—
2D	—	—	Ground (Input)	Constant	0V	—
2E	○		Distributor (Ne-signal)	Ignition switch ON	Approx. 0V or 5V	—
				Idle	Approx. 2V	
2F	—	—	—	—	—	—
2G	○		Distributor (G-signal)	Ignition switch ON	Approx. 0V or 5V	
				Idle	Approx. 1.5V	
2H	—	—	—	—	—	—
2I	—	—	—	—	—	—
2J	○		Knock control unit	Idle	Approx. 4.0V	—
2K	○		Throttle sensor/ Airflow meter	Constant	4.5—5.5V	—
2L	—	—	—	—	—	—
2M	○		Throttle sensor	Accelerator pedal released	Approx. 0.5V	—
				Accelerator pedal fully depressed	Approx. 4.0V	
2N	○		Oxygen sensor	Ignition switch ON	0V	—
				Idle (Cold engine)	0V	
				Idle (After warm-up)	0—1.0V	
				Increasing engine speed (After warm-up)	0.5—1.0V	
				Deceleration	0—0.4V	
2O	○		Airflow meter	Ignition switch ON	Approx. 3.8V	—
				Idle	Approx. 3.0V	
2P	○		Intake air thermosensor	Ambient air temperature 20°C (68°F)	Approx. 2.5V	In airflow meter
2Q	○		Water thermosensor	Engine coolant temperature 20°C (68°F)	Approx. 2.5V	—
				After warm-up	Below 0.5V	
2R		○	Turbocharge indicator	Ignition switch ON	Approx. 12V	—



2Y	2W	2U	2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A	1U	1S	1Q	1O	1M	1K	1I	1G	1E	1C	1A
2Z	2X	2V	2T	2R	2P	2N	2L	2J	2H	2F	2D	2B	1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B

Terminal	Input	Output	Connected to	Test condition	Correct voltage	Remark
2S		○	Overboost warning buzzer	Ignition switch ON	Approx. 12V	—
2T		○	Solenoid valve (Pressure regulator)	180 seconds after engine started when engine coolant temperature above 90°C (194°F) and intake air temperature above 58°C (136°F)	Below 1.5V	—
				Other condition at idle	Approx. 12V	
2U		○	Injector (Nos. 1, 3)	Ignition switch ON	Approx. 12V	* Engine Signal Monitor: Green and red lamps flash
				Idle	Approx. 12V*	
				Engine speed above 2,000 rpm on deceleration (After warm-up)	Approx. 12V	
2V		○	Injector (Nos. 2, 4)	Ignition switch ON	Approx. 12V	
				Idle	Approx. 12V*	
				Engine speed above 2,000 rpm on deceleration (After warm-up)	Approx. 12V	
2W		○	ISC valve	Ignition switch ON	Approx. 7V	—
				Idle	Approx. 9V	
2X		○	Solenoid valve (Purge control)	Ignition switch ON	Approx. 12V	—
				Idle	Approx. 12V	
2Y		○	Circuit opening relay	Ignition switch ON	Approx. 12V	—
				Idle	Below 1.0V	
2Z	—	—	—	—	—	—



2Y	2W	2U	2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A	1U	1S	1Q	1O	1M	1K	1I	1G	1E	1C	1A
2Z	2X	2V	2T	2R	2P	2N	2L	2J	2H	2F	2D	2B	1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B

CLUTCH

OUTLINE

OUTLINE OF CONSTRUCTION .... H—1
SPECIFICATIONS .... H—1
CLUTCH CONTROL .... H—2
CLUTCH PEDAL .... H—2
CLUTCH MASTER CYLINDER .... H—4
RELEASE BEARING .... H—5

OUTLINE

OUTLINE OF CONSTRUCTION

A hydraulic clutch control mechanism is used.
The basic construction is the same as that of Laser 2WD model, but there is no interchangeability of parts except for the release cylinder.

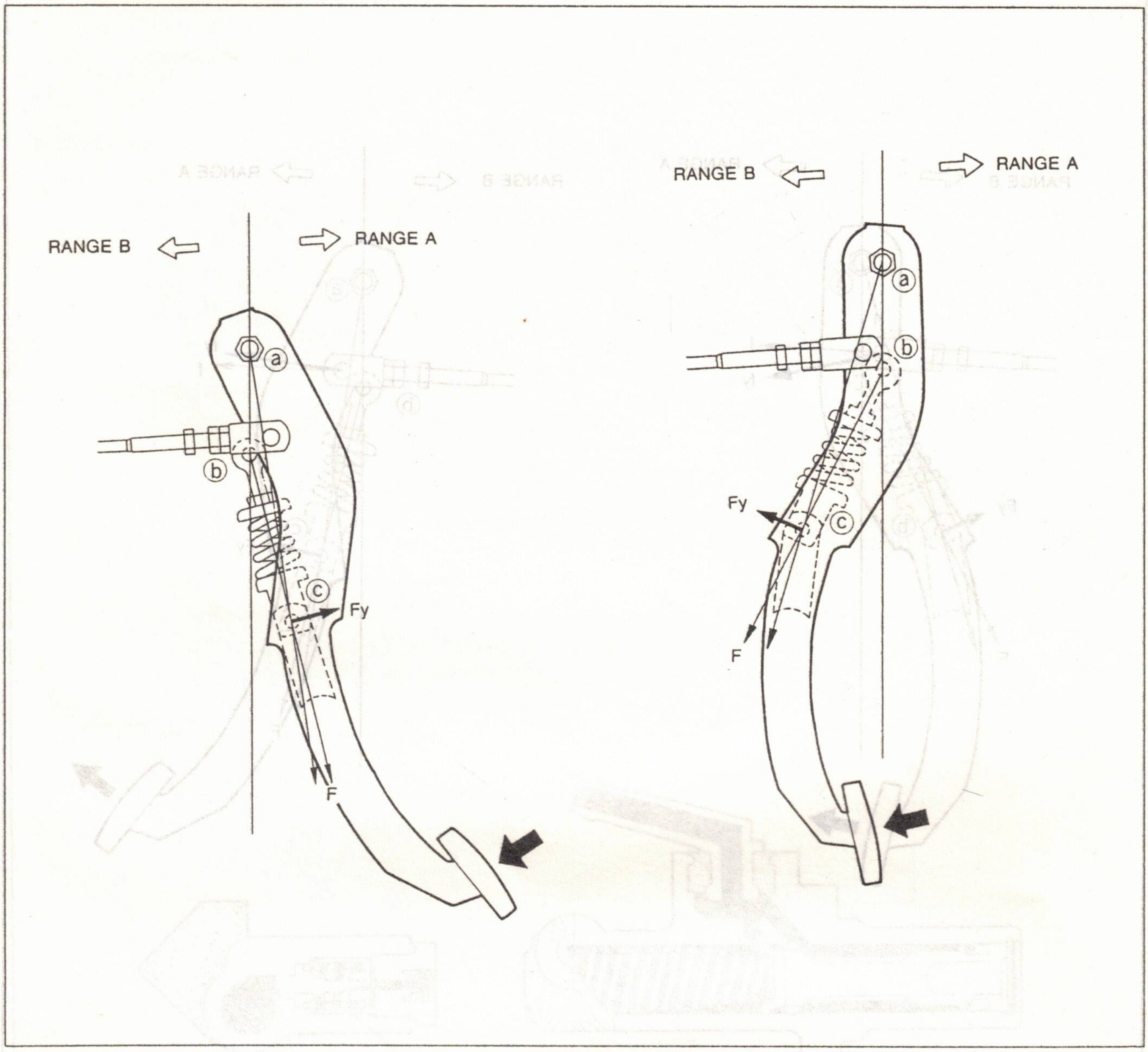
1. An assist/return spring is used on the BP DOHC Turbo model to reduce the required clutch pedal effort.
2. The hydraulic clutch master cylinder for the BP DOHC Turbo model has a built-in check valve.
3. To improve clutch operation feel and increase parts life, a friction plate and needle roller bearings are used between the release fork and the release bearing.

SPECIFICATIONS

Item		Engine/Transaxle	BP DOHC Turbo
			G5MX-R
Clutch control			Hydraulic
Clutch cover	Type		Diaphragm spring
	Set load N (kg, lb)		5,494 (560, 1,232)
Clutch disc	Outer diameter mm (in)		230 (9.055)
	Inner diameter mm (in)		155 (6.102)
	Thickness	Pressure plate side mm (in)	3.2 (0.126)
		Flywheel side mm (in)	3.2 (0.126)
Clutch pedal	Type		Suspended
	Pedal ratio	LHD	6.55
		RHD	6.7
	Full stroke mm (in)		135 (5.32)
	Height (With carpet) mm (in)		196—204 (7.72—8.03)
Master cylinder	Inner diameter mm (in)		15.87 (0.625)
Release cylinder	Inner diameter mm (in)		19.05 (0.750)
Clutch fluid			SAE J1703 or FMVSS116 DOT-3

CLUTCH PEDAL

- An assist/return spring is used on BP DOHC Turbo engine-equipped models to reduce the required pedal effort.
- The assist/return spring is mounted vertical to the pedal



Operation

With the clutch pedal fully released, the assist/return spring is compressed, causing force F to act upon fulcrum ⓒ.

As a result, force Fy is created, and acts upon fulcrum ⓒ to hold the pedal outward.

1. When clutch pedal depressed.

   (1) Fulcrum ⓒ within range A

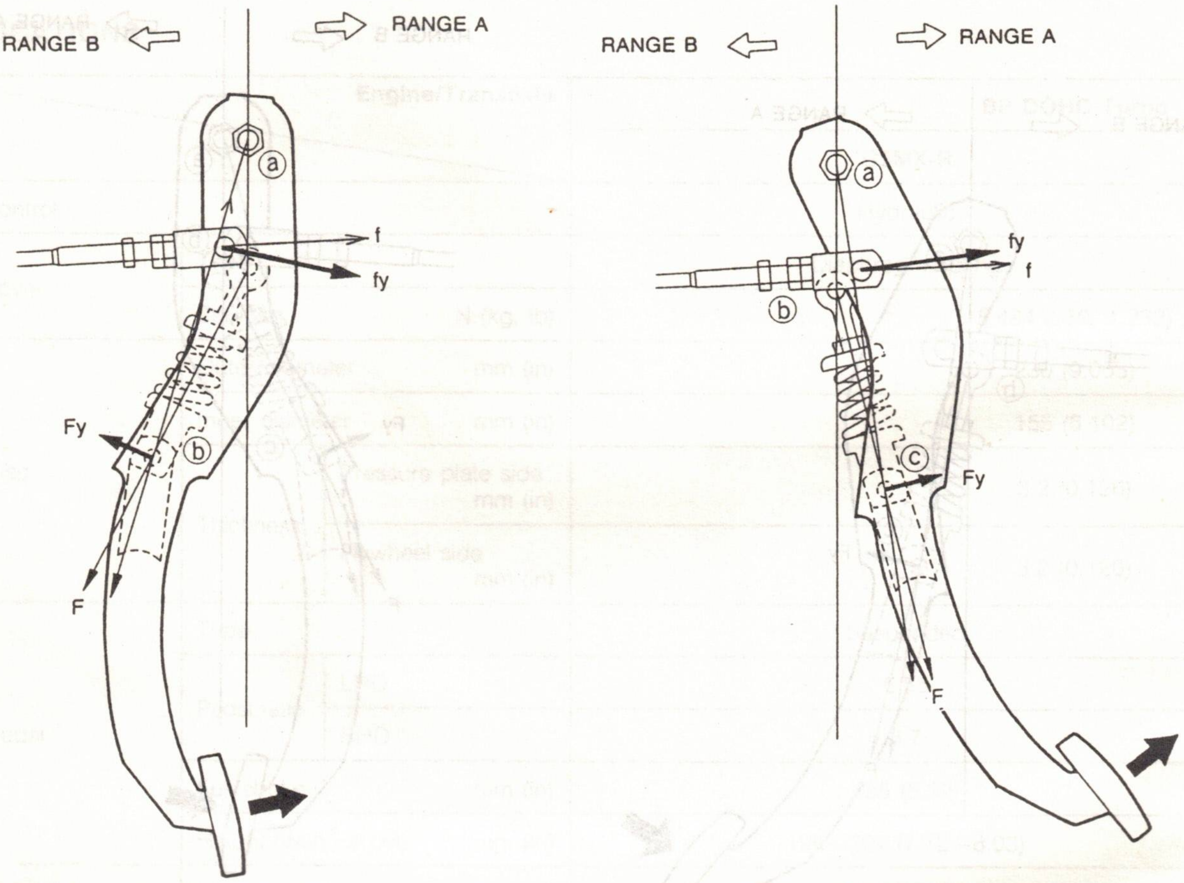
   When the pedal is depressed, it moves inward, centered upon fulcrum ⓐ.

   Fy, which is the force opposing pedal movement, acts upon fulcrum ⓒ until fulcrum ⓒ crosses the imaginary line connecting fulcrums ⓐ and ⓑ.

   As a result, there is a slight feeling of resistance when the clutch pedal is first depressed.

   (2) With fulcrum ⓒ within range B

   When fulcrum ⓒ crosses the imaginary line between fulcrums ⓐ and ⓑ, Fy now acts in the same direction as pedal movement, thus reducing the force required to depress the pedal.



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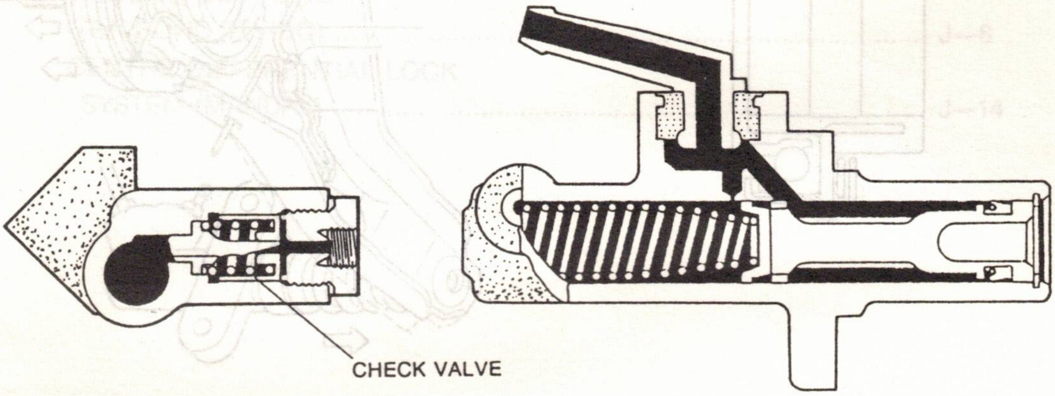
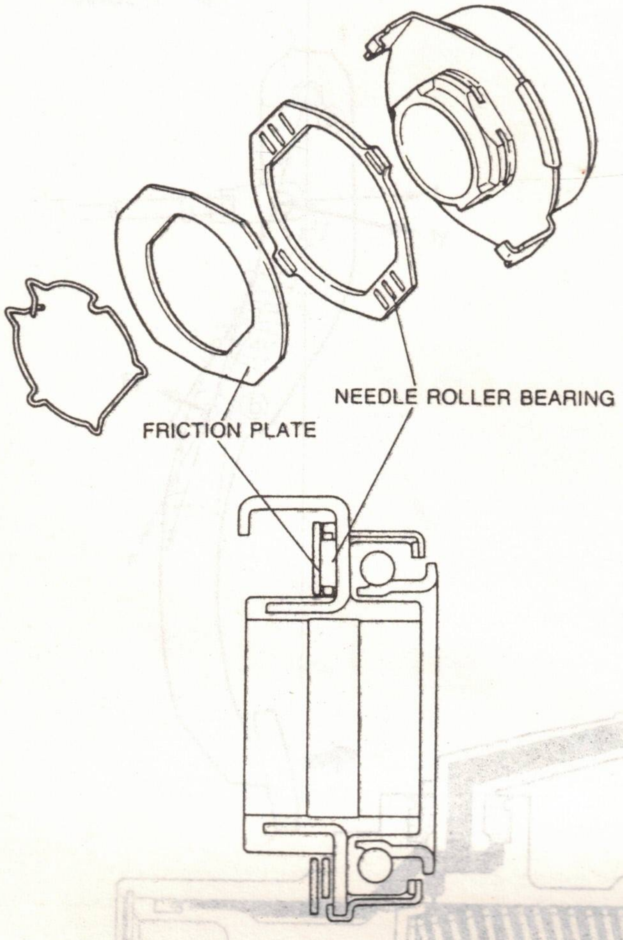
2. When clutch pedal released.
   (1) With fulcrum ⓒ within range B
   When the clutch pedal is released, reaction force f (from clutch master cylinder push rod) is applied, and fy force pushing outward overcomes Fy force, with the result that the clutch pedal moves outward, centered upon fulcrum ⓐ.
   (2) With fulcrum ⓒ within range A
   When fulcrum ⓒ crosses the imaginary line between fulcrums ⓐ and ⓑ, force Fy, which is a result of force F trying to expand the spring, is added to fy and pushes the pedal fully outward.

CLUTCH MASTER CYLINDER

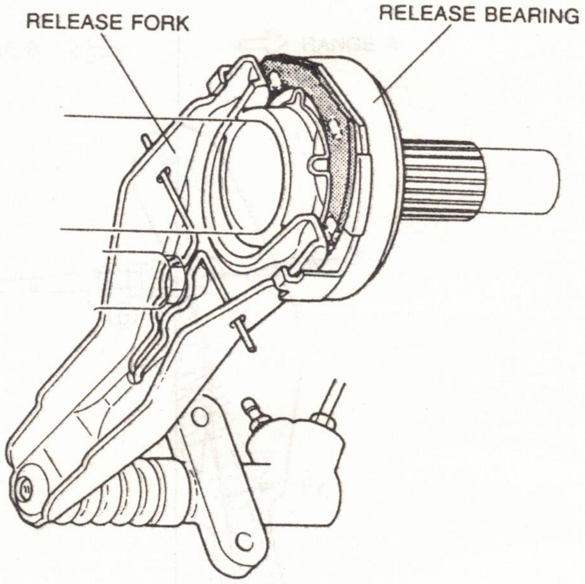


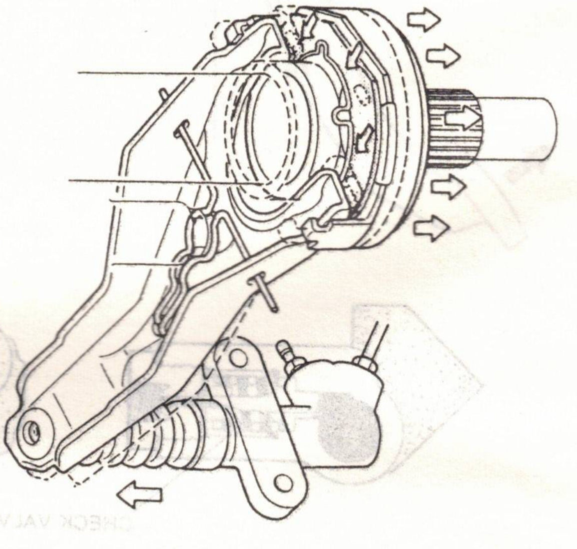
A hydraulic clutch master cylinder with a built-in check valve is used on the BP DOHC Turbo model. This is to provide smooth engagement of the clutch disc by controlling (by the check valve) the flow of fluid from the clutch release cylinder back to the master cylinder when the clutch pedal is released, thus cushioning the impact "shock".

RELEASE BEARING



CLUTCH PEDAL RELEASED





CLUTCH PEDAL DEPRESSED

To improve clutch operation feel and increase parts life, a newly designed friction plate and needle roller bearings are used between the release fork and the release bearing.
With the inclusion of this friction plate, the force required to depress the clutch pedal is reduced because the usual sliding-contact action between the release bearing and the release fork is changed to the rolling action of the friction plate.

MANUAL TRANSAXLE AND TRANSFER UNIT (G5MX-R)

OUTLINE

OUTLINE OF CONSTRUCTION .... J—1
SPECIFICATIONS .... J—2
TRANSAXLE AND TRANSFER UNIT .... J—3
STRUCTURAL VIEW .... J—3

TRANSAXLE

DOUBLE CONE SYNCHRO MECHANISM .... J—4
SHIFT FORKS AND SHIFT RODS .... J—5
INTERLOCK MECHANISM .... J—6

TRANSFER UNIT

CENTRE DIFFERENTIAL .... J—7
VISCOUS COUPLING (BP DOHC TURBO) .... J—8
CENTRE DIFFERENTIAL LOCK SYSTEM (MANUAL) .... J—14

OUTLINE

OUTLINE OF CONSTRUCTION

- Full-time 4-wheel drive, incorporating a viscous coupling is used on the BP DOHC Turbo model.

  With this system all driving conditions are easily contended with; from good roads to bad roads and adverse weather conditions.
- The transaxle and transfer unit were developed based on the G5M-R type transaxle.
- The centre differential employs a planetary carrier system and a viscous coupling, and functions to distribute the driving force to the front and rear differentials as required.
  Through the use of this centre differential, tyre scuffing common to 4-wheel drive vehicles during tight cornering, is eliminated.

SPECIFICATIONS
TRANSAXLE AND TRANSFER UNIT

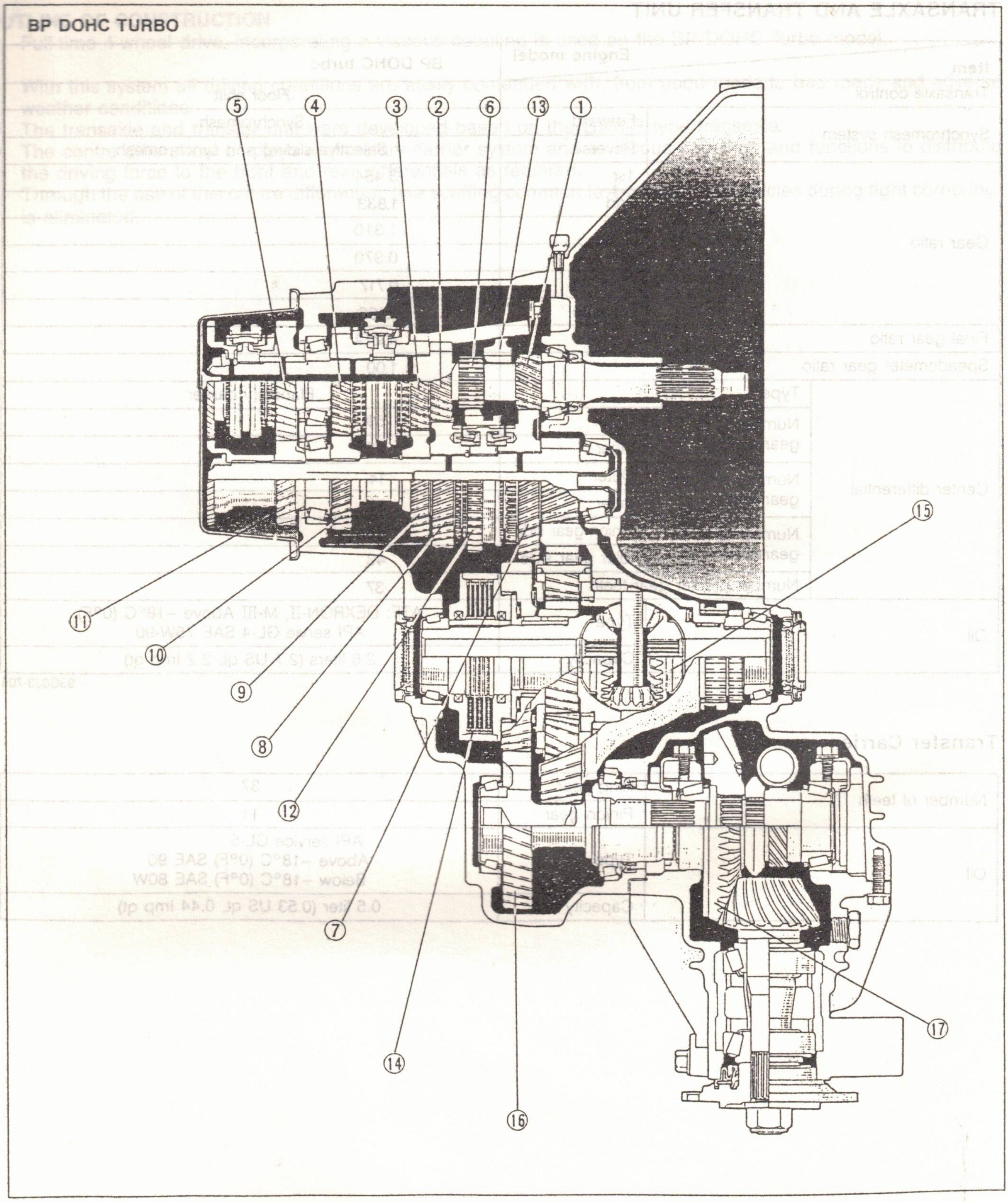
Item \ Engine model			BP DOHC turbo
Transaxle control			Floor shift
Synchromesh system		Forward	Synchromesh
		Reverse	Selective sliding and synchromesh
Gear ratio		1st	3.454
		2nd	1.833
		3rd	1.310
		4th	0.970
		5th	0.717
		Reverse	3.166
Final gear ratio			4.214
Speedometer gear ratio			1.00
Center differential	Type		Planetary carrier
	Number of ring gear teeth	Outer	59
		Inner	75
	Number of pinion gear teeth	Outer	14
		Inner	14
	Number of sun gear teeth	Pinion gear side	43
		Idler gear side	43
	Number of idler gear teeth		37
Oil		Type	ATF: DEXRON-Ⅱ, M-Ⅲ Above −18°C (0°F) API servie GL-4 SAE 75W-90
		Capacity	2.6 liters (2.7 US qt, 2.2 Imp qt)

93G0J3-705

Transfer Carrier

Number of teeth	Ring gear	37
	Pinion gear	11
Oil	Type	API service GL-5 Above −18°C (0°F) SAE 90 Below −18°C (0°F) SAE 80W
	Capacity	0.5 liter (0.53 US qt, 0.44 Imp qt)

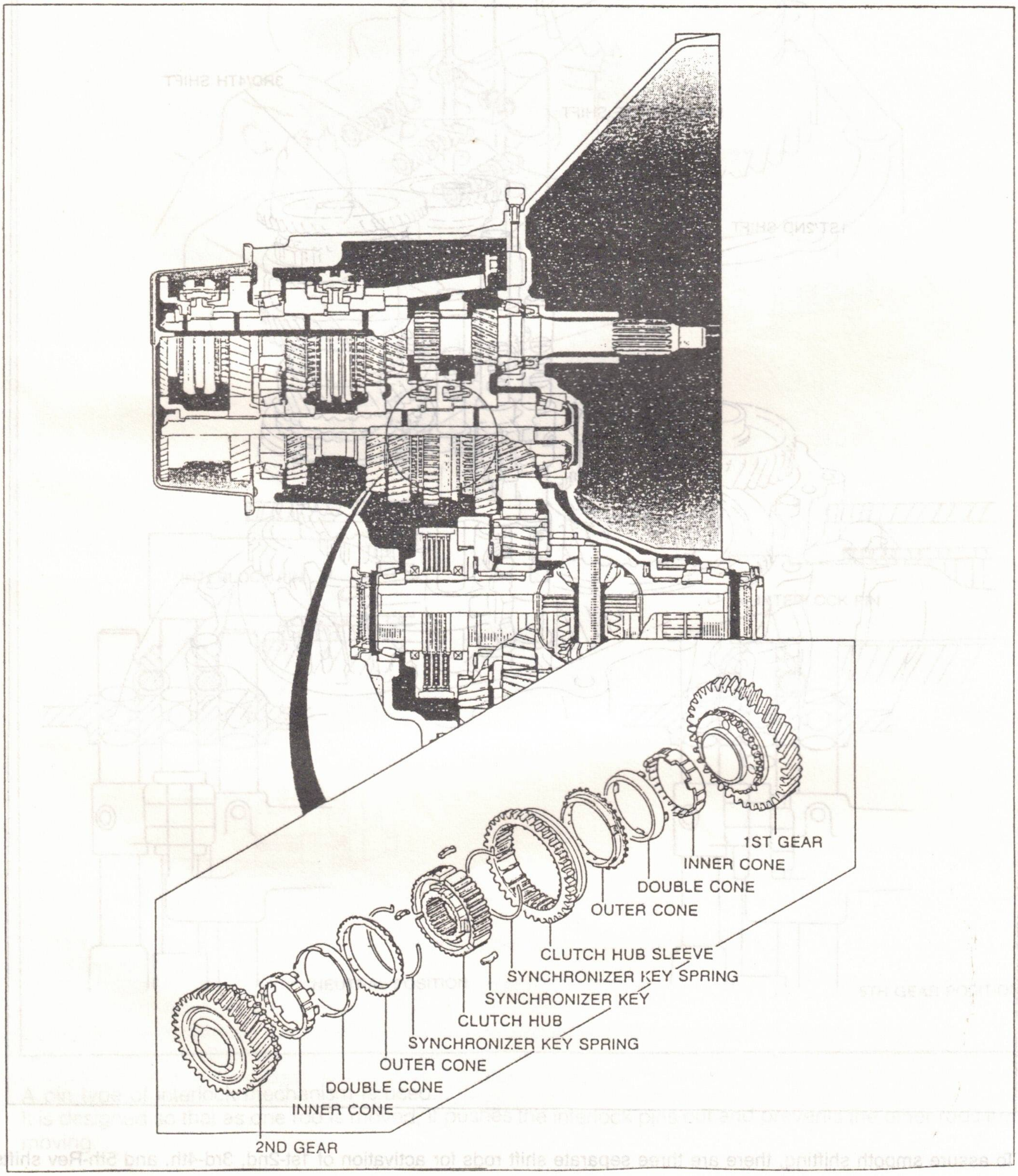
STRUCTURAL VIEW


BP DOHC TURBO

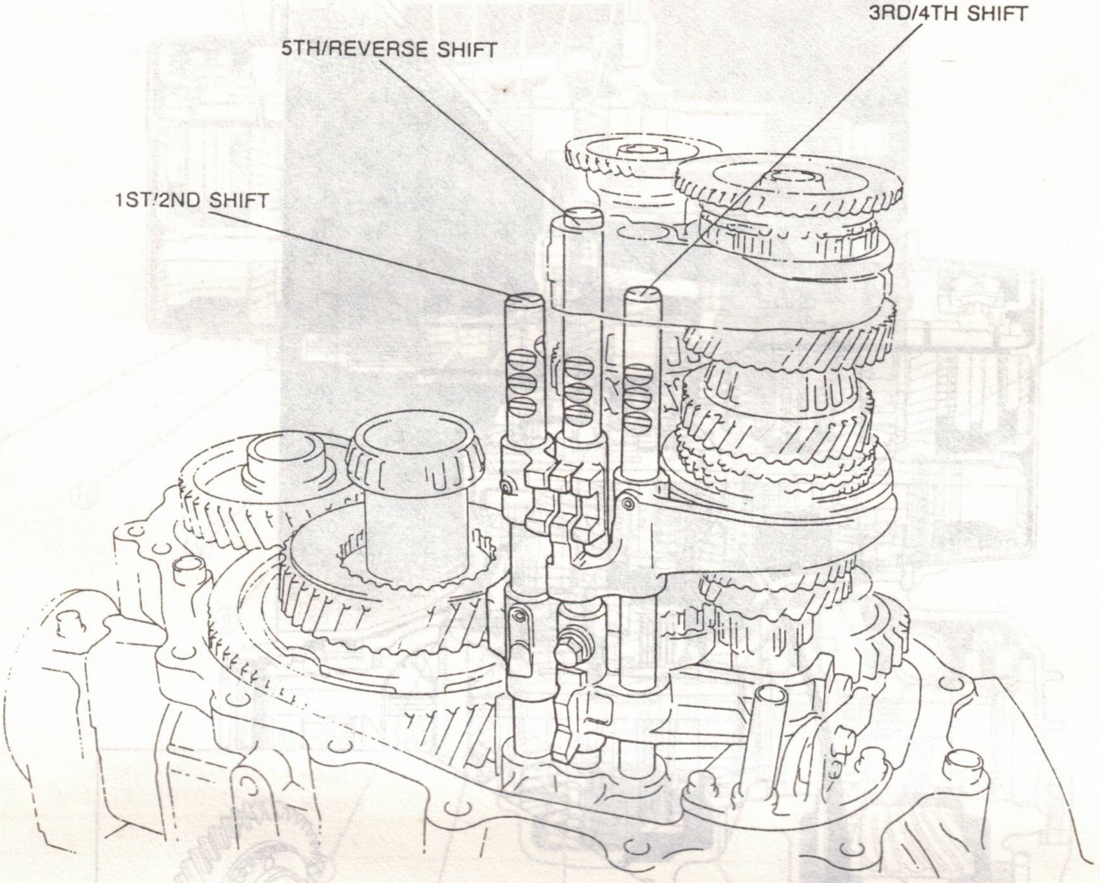
1. Primary 1st gear
2. Primary 2nd gear
3. Primary 3rd gear
4. Primary 4th gear
5. Primary 5th gear
6. Primary reverse gear
7. Secondary 1st gear
8. Secondary 2nd gear
9. Secondary 3rd gear
10. Secondary 4th gear
11. Secondary 5th gear
12. Secondary reverse gear
13. Reverse idler gear
14. Viscous coupling
15. **Front and centre differential assembly.**
16. Idler gear assembly
17. Transfer carrier assembly

DOUBLE CONE SYNCHRO MECHANISM

- The double cone synchro mechanism is used for 1st and 2nd gears on the BP DOHC turbo model of the G5MX-R type transaxle in order to shorten the synchro time and to lessen the force required to shift the transmission.
- The adoption of the double cone synchro mechanism also makes possible a more compact configuration and a greater synchro capacity.
- The double cone synchro mechanism is comprised of the outer cone, the double cone, the inner cone, and the inner cone hub.

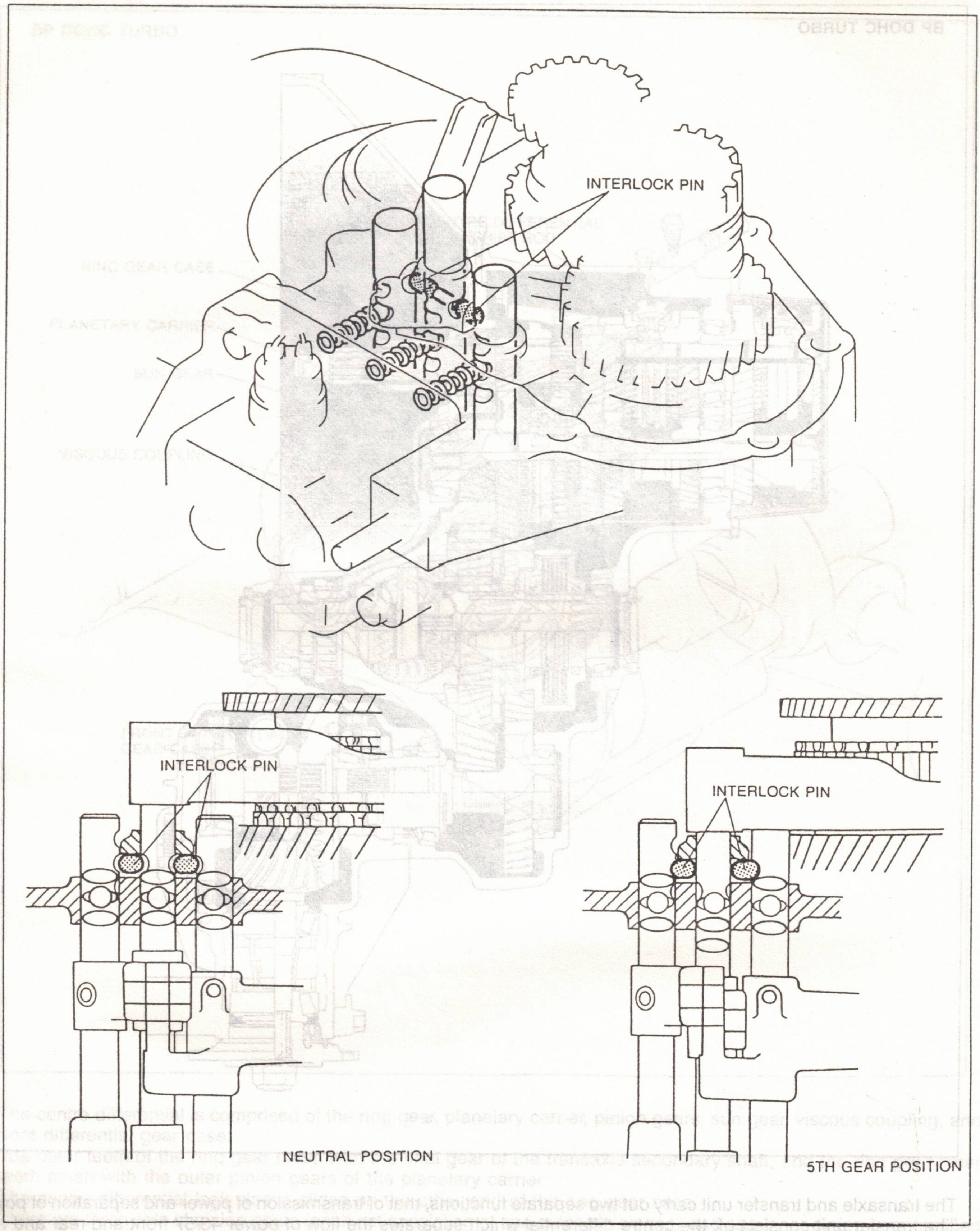


SHIFT FORKS AND SHIFT RODS



To assure smooth shifting, there are three separate shift rods for activation of 1st-2nd, 3rd-4th, and 5th-Rev shifts.

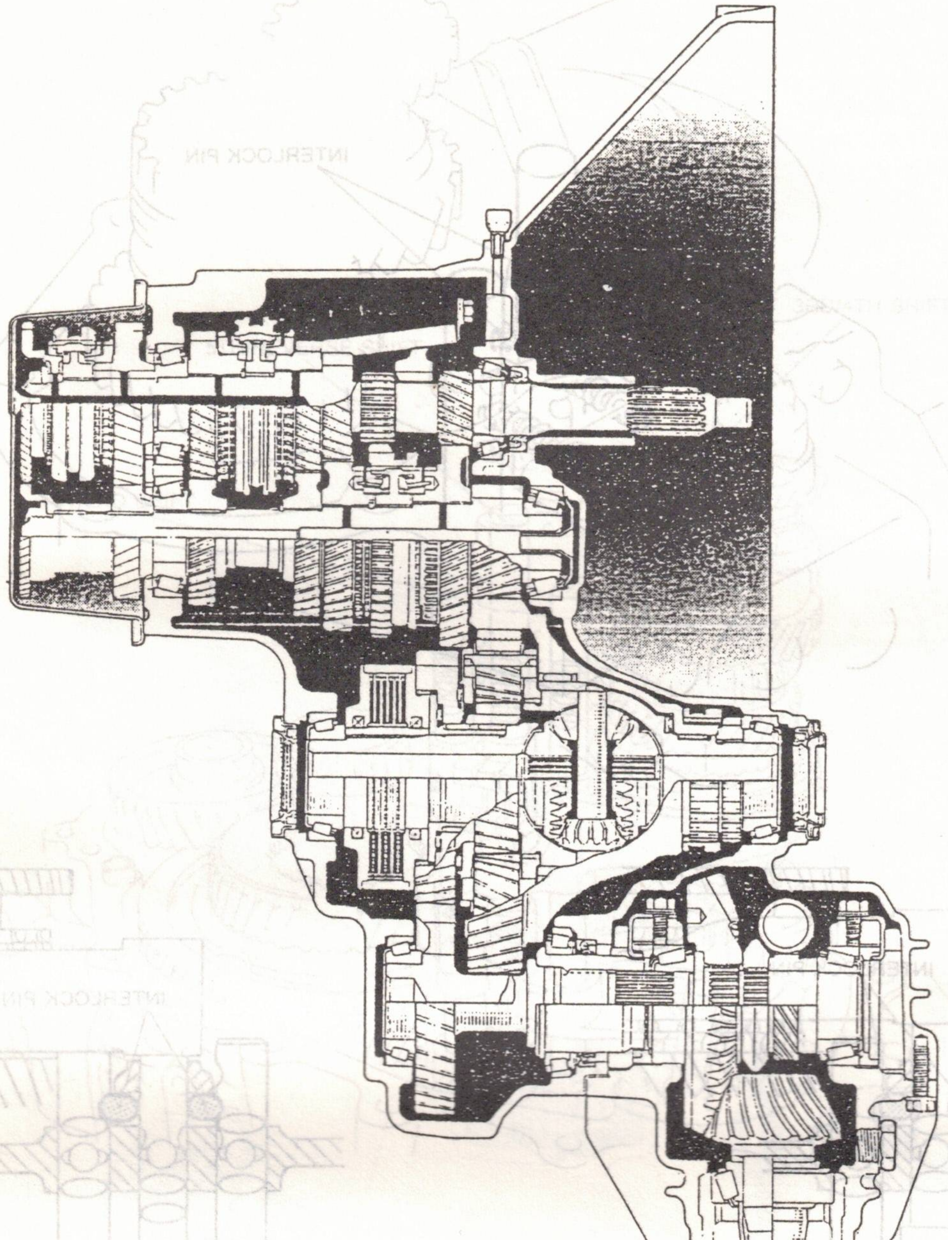
INTERLOCK MECHANISM



A pin type of interlock mechanism is used.
It is designed so that as one rod is moved, it pushes the interlock pins out and prevents the other rods from moving.

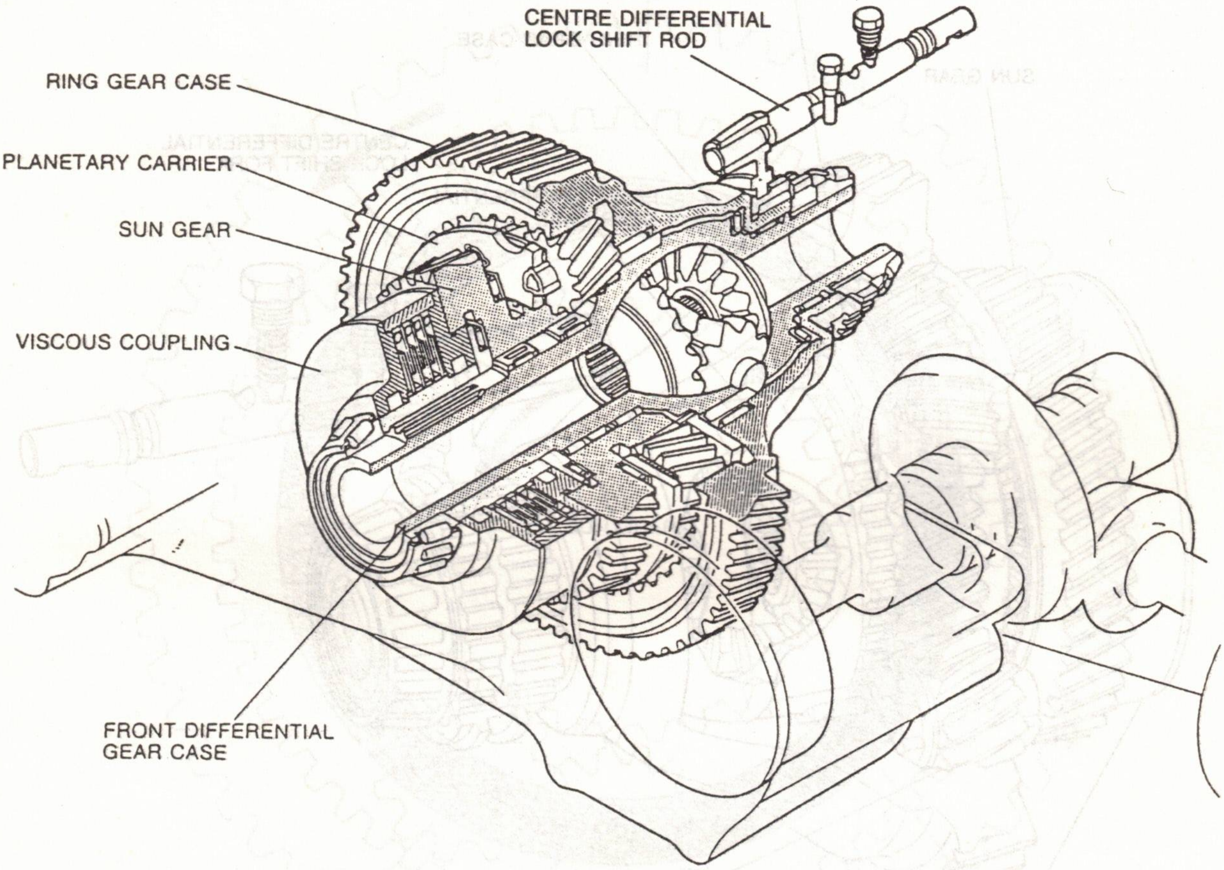
TRANSFER UNIT

BP DOHC TURBO



The transaxle and transfer unit carry out two separate functions, that of transmission of power and separation of power. The transfer unit consists of; the centre differential which separates the flow of power 43/57 front and rear and also compensates for the speed differential of the front and rear differentials. The viscous coupling interlocks the front and rear axles under slippery road conditions. The front differential drives the front wheels. The transfer carrier drives the rear wheels through the rear differential.

BP DOHC TURBO


CENTRE DIFFERENTIAL LOCK SHIFT ROD
RING GEAR CASE
PLANETARY CARRIER
SUN GEAR
VISCOUS COUPLING
FRONT DIFFERENTIAL GEAR CASE

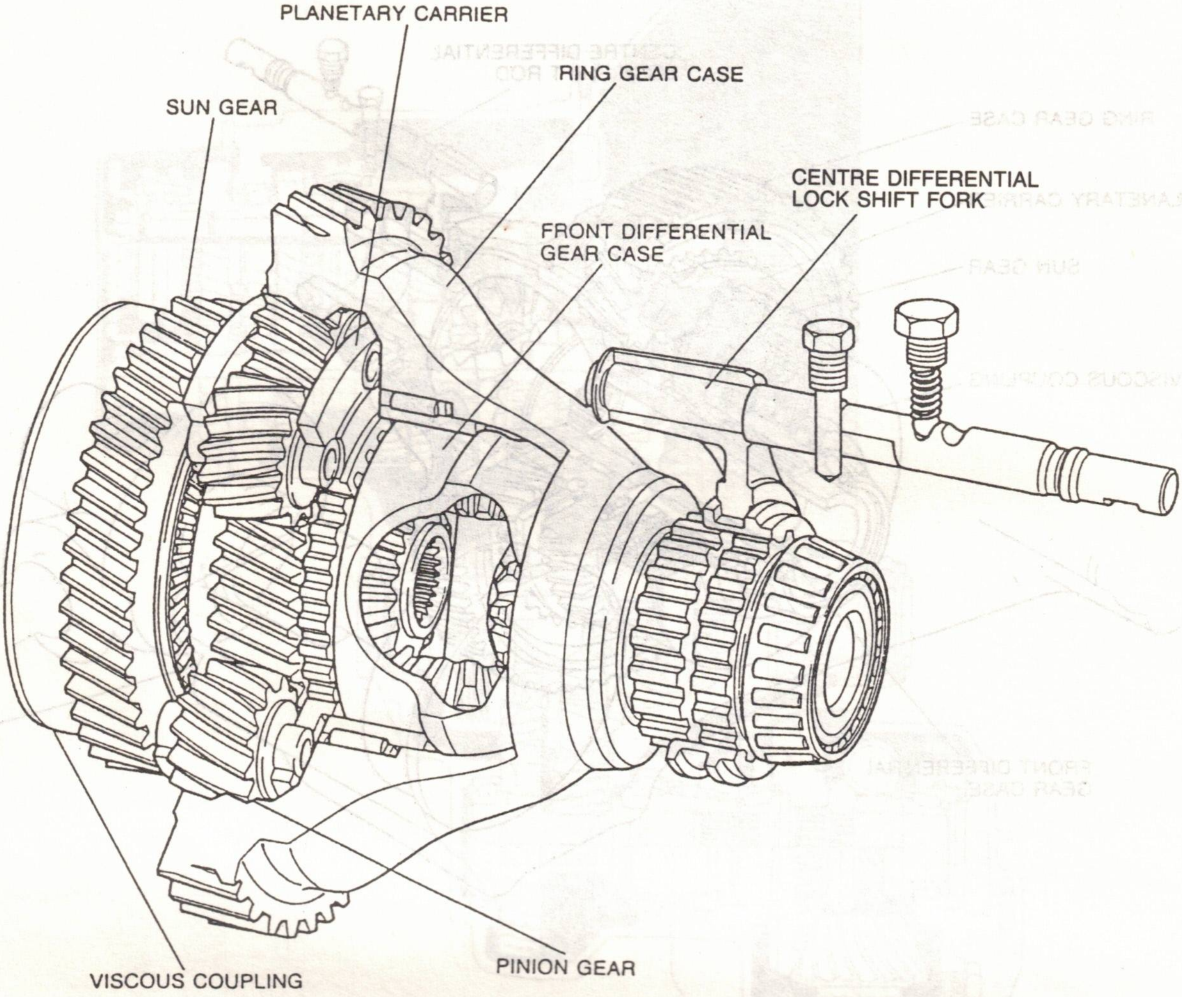
The centre differential is comprised of the ring gear, planetary carrier, pinion gears, sun gear, viscous coupling, and front differential gear case.

The outer teeth of the ring gear mesh with the final gear of the transaxle secondary shaft, and the ring gear inner teeth mesh with the outer pinion gears of the planetary carrier.

The centre differential lock sleeve slides on the other end of the ring gear case.

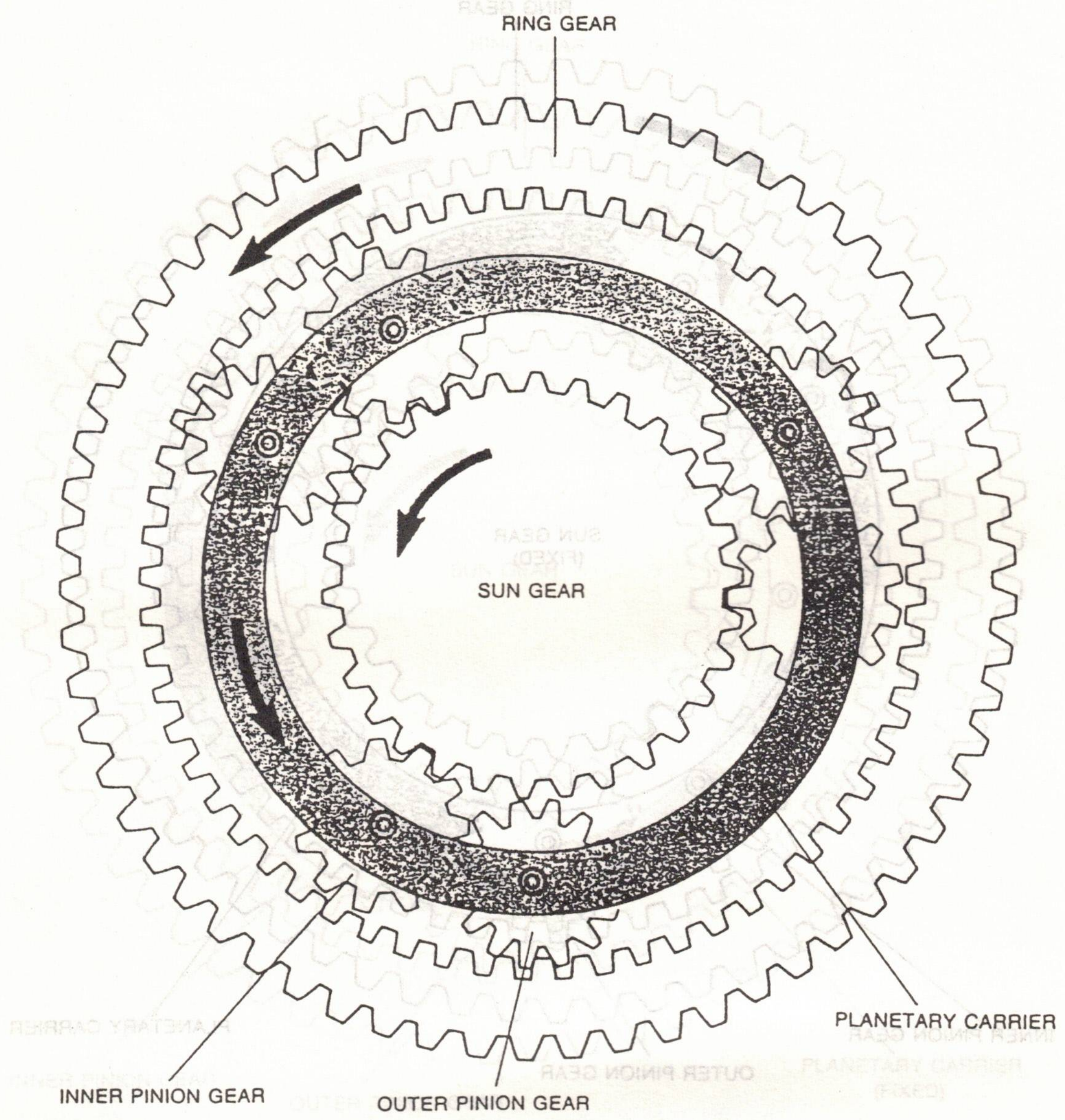
There are three sets of pinion gears (each set consisting of one outer pinion gear and one inner pinion gear) spaced at regular intervals. The outer pinion gears mesh with the inner teeth of the ring gear, and the inner pinion gears mesh with the sun gear. The outer and inner pinion gears also mesh with each other.

The outer teeth of the viscous coupling mesh with the sun gear, and the inner teeth of the viscous coupling mesh with the front differential gear case.



In addition, the planetary carrier is coupled to the front differential gear case and can be manually locked to the ring gear case by the centre differential lock sleeve.

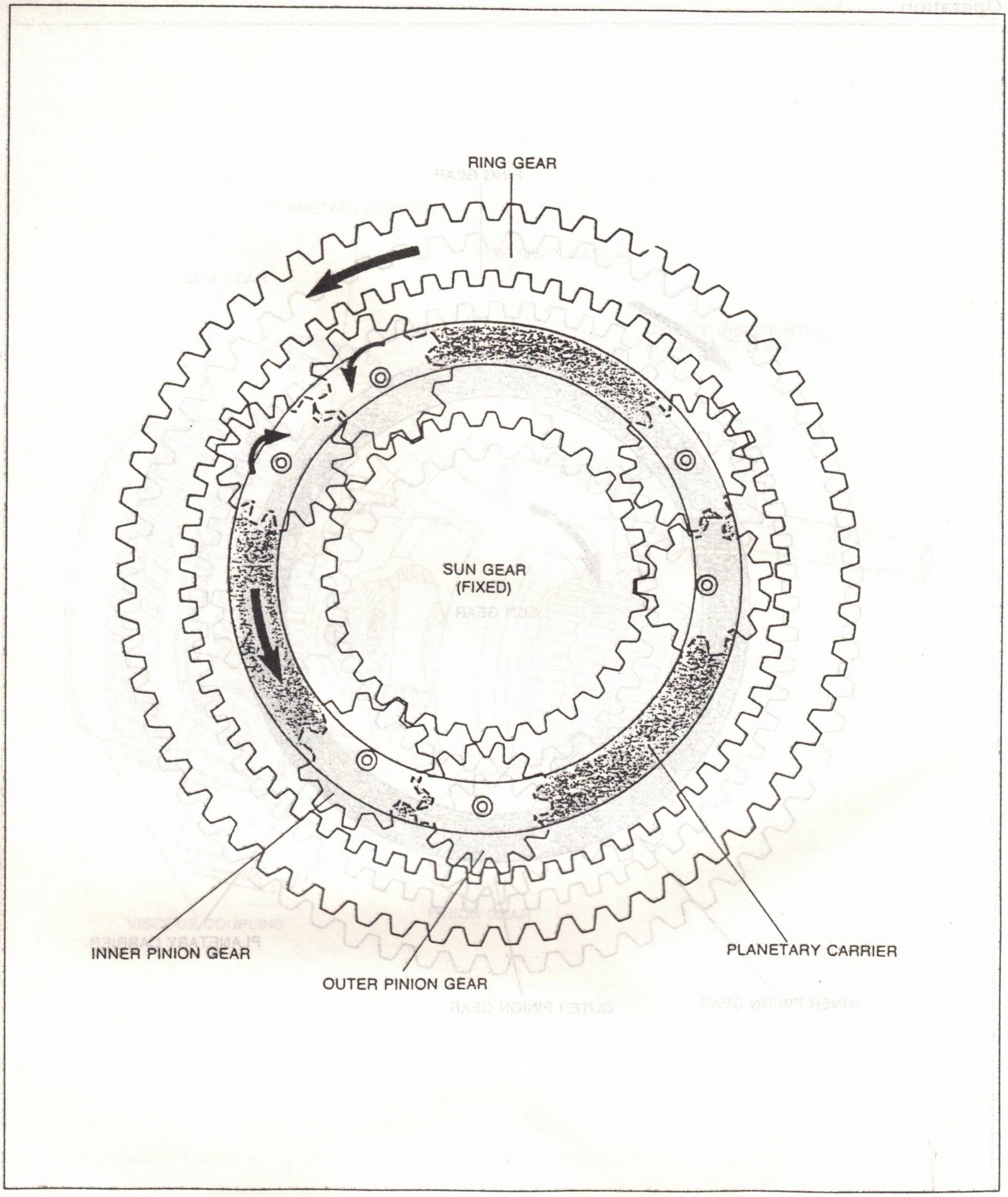
The sun gear is meshed with the inner pinion gears of the planetary carrier. The other side of the sun gear provides power to the rear differential through the idler gear, transfer carrier, and propeller shaft. The ring gear is the input driving force, and the output forces are the planetary carrier (front differential) and the sun gear (rear differential).



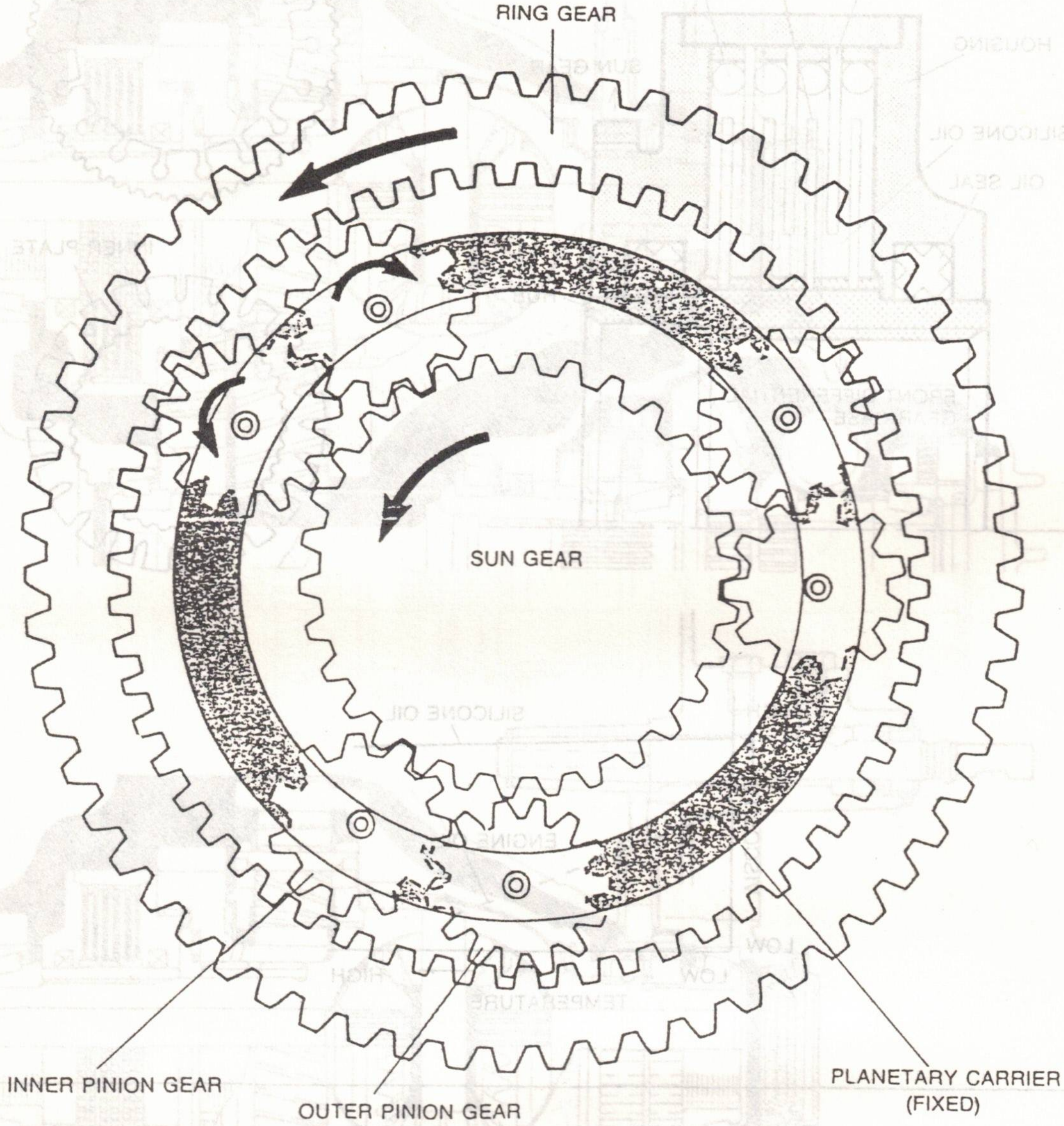
During straight-ahead travel

Driving force from the engine is transmitted from the final gear of the transaxle secondary shaft to the ring gear of the centre differential, causing the ring gear to rotate.

Because the speed of the front and rear wheels are the same during straight-ahead travel, the planetary carrier (output force to the front wheels) and the sun gear (output force to the rear wheels) act united (fixed condition) and rotate together with the ring gear.

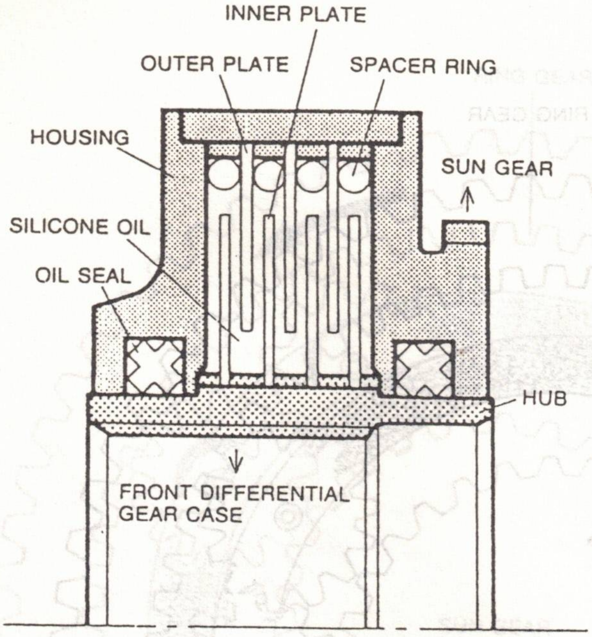


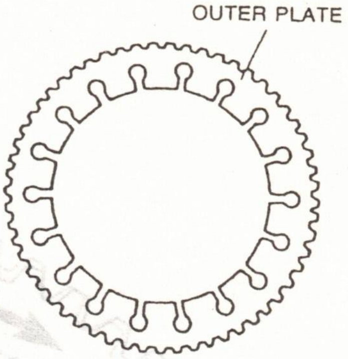
Front wheel speed greater than rear wheels
The speed of the sun gear (output force to the rear wheels) is less than that of the planetary carrier (output force to the front wheels), thus it is effectively fixed.
As a result, the outer pinion gears rotate clockwise and the inner pinion gears rotate counterclockwise, thus rotating the planetary carrier counterclockwise.
In this way, the centre differential absorbs the speed difference between the front and rear wheels and the driving force is distributed uniformly to the front and rear differentials.

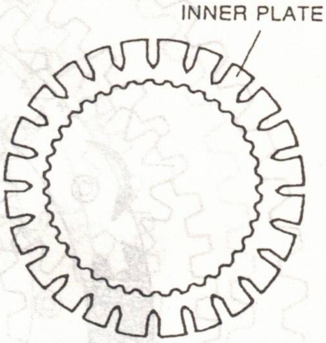


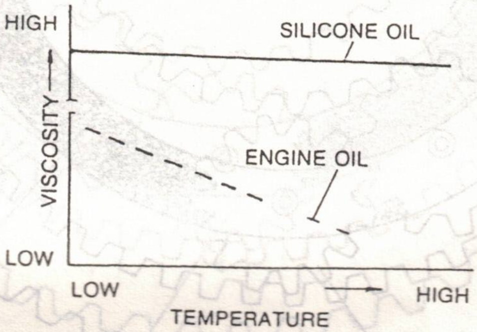
Rear wheel speed greater than front wheels
The speed of the planetary carrier (output force to front wheels) is less than that of the sun gear (output force to rear wheels), thus effectively becoming fixed. As a result, the outer pinion gears rotate counterclockwise and the inner pinion gears rotate clockwise, rotating the sun gear counterclockwise.

VISCOUS COUPLING (BP DOHC TURBO)









Operation

If the vehicle encounters very slippery conditons and one wheel starts to spin, the centre differential absorbs the speed difference and the other three wheels lose driving force.

At times like this, the viscous coupling automatically causes the centre differential to lock so that the front and rear axles are interconnected, and driving force is transmitted to all wheels.

Construction

The viscous coupling consists of a number of thin steel inner and outer plates and high-viscosity silicone oil. The outer plates couple the housing and the splines.

The housing, via the sun gear and transfer carrier, is linked to the rear wheels.

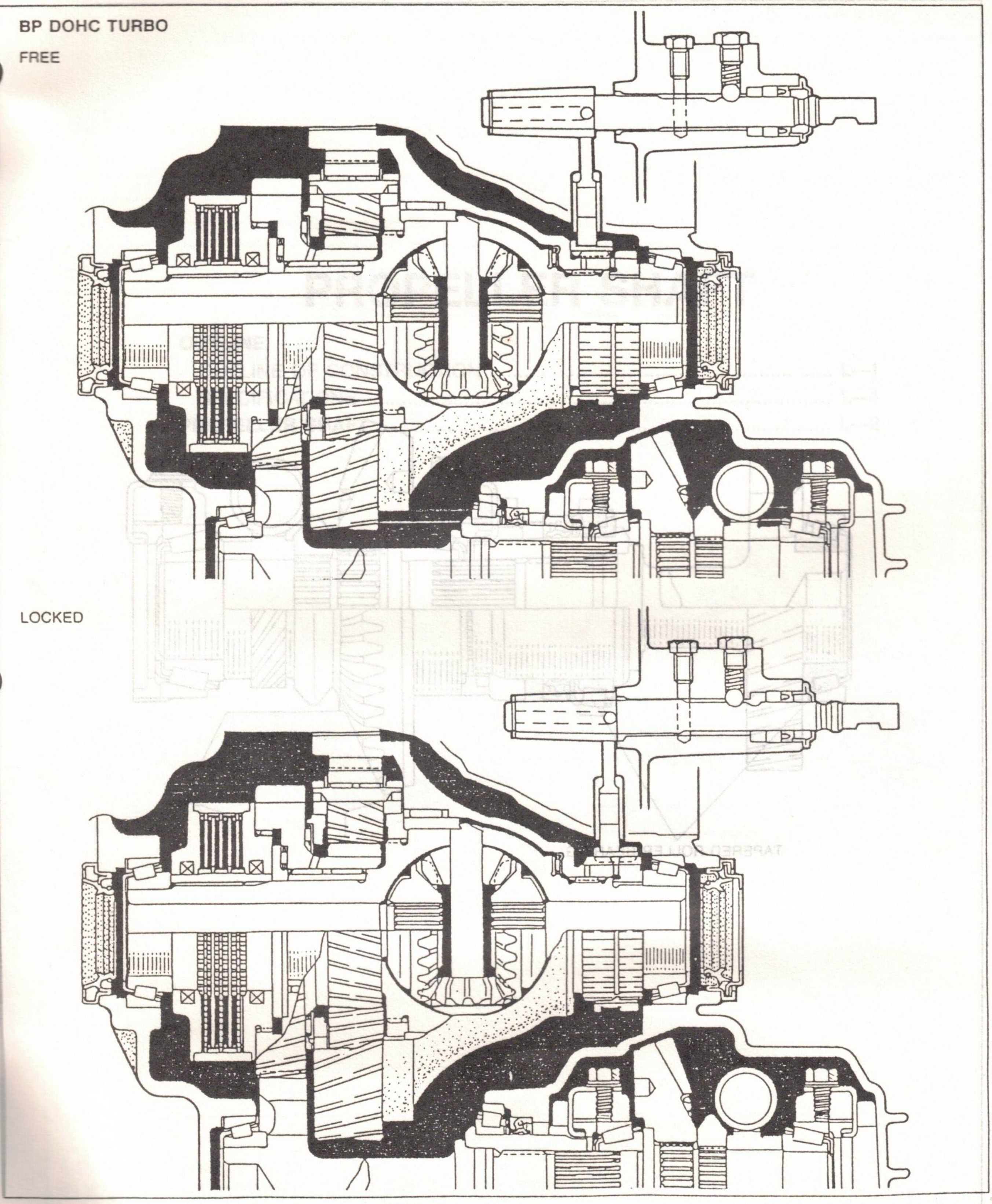
Between the outer plates are spacer rings. The inner plates are coupled to the hub, and the hub, via the front differential gear case and the driveshafts, is linked to the front wheels.

The inner plates can move side to side on the hub.

The slots in the plates create shearing of the silicone oil and cause a fluid coupling effect.

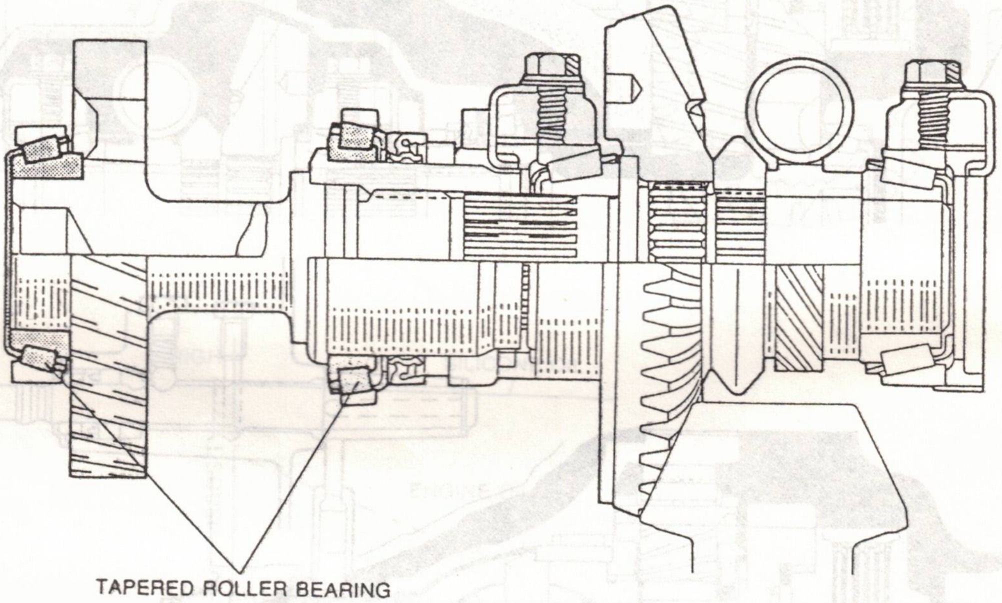
The viscous coupling unit is sealed by heat — and pressure-resistant oil seals, and is not rebuildable.

CENTRE DIFFERENTIAL LOCK SYSTEM (MANUAL)



The centre differential should not be locked for normal driving.
If the vehicle is to be tested on a speedometer tester or a chassis dynamometer, the propeller shaft must be removed to prevent the vehicle from jumping off the tester. And, because the propeller shaft is removed, the centre differential must be manually locked to provide power to the front wheels.
The centre differential is manually locked by pulling the differential lock rod outward.

IDLER GEAR SHAFT



For improved transaxle reliability, a tapered roller bearing is now fitted at the ring gear end of the idler gear sh for better support; in addition, the bearing at the idler gear end of the shaft is changed from a ball bearing to a taper roller bearing.

PROPELLER SHAFT

OUTLINE

OUTLINE OF CONSTRUCTION .... L—1
SPECIFICATIONS .... L—1
PROPELLER SHAFT .... L—2

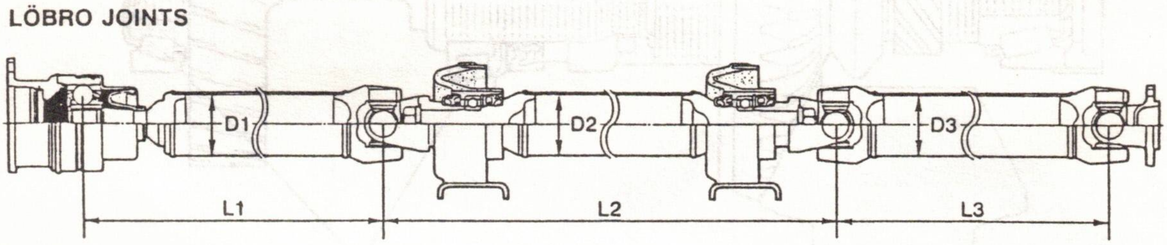
OUTLINE

OUTLINE OF CONSTRUCTION

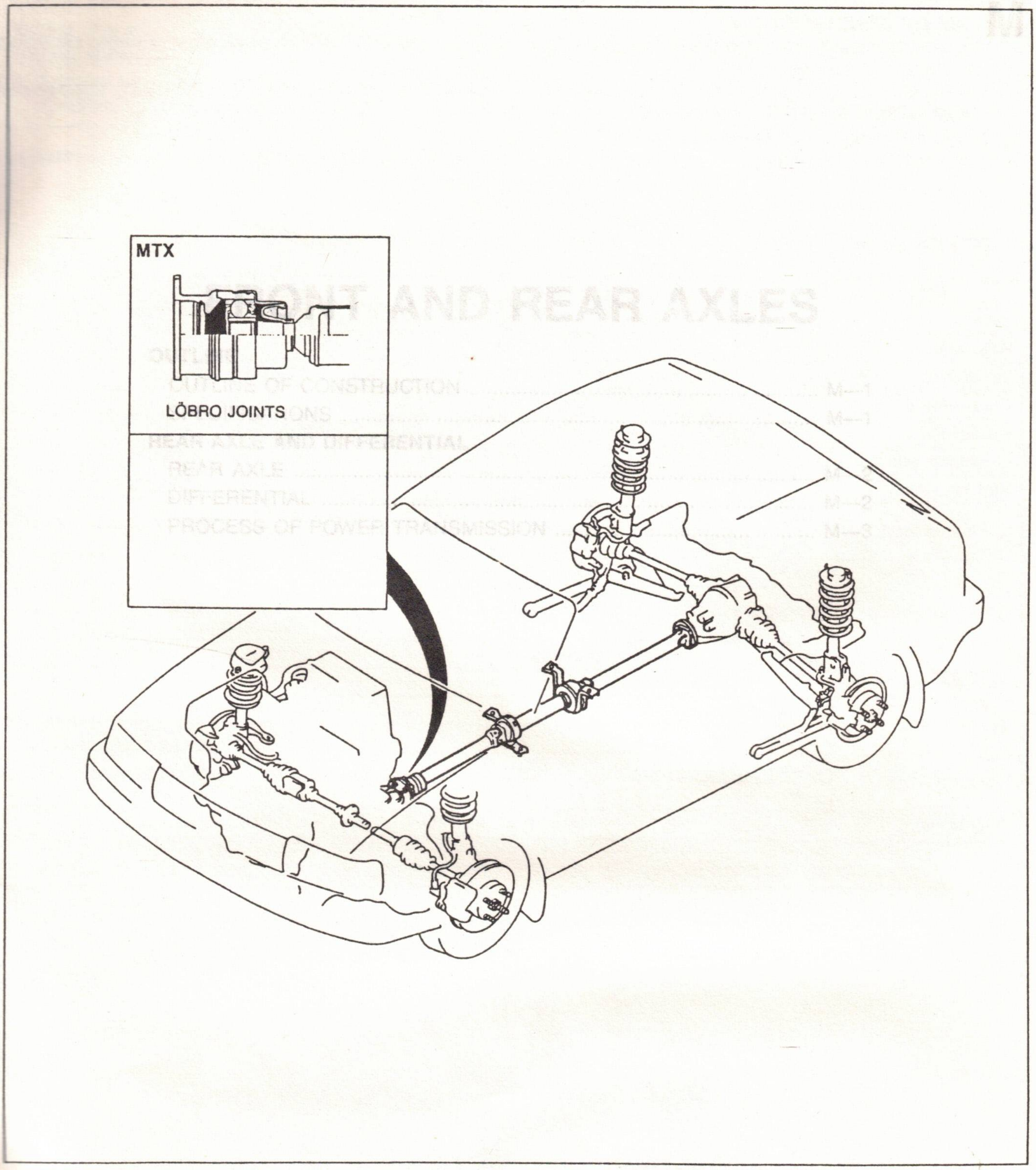
1. The propeller shaft is a three-piece, four-joint type with two centre bearings for support.

SPECIFICATIONS

Item	Transaxle		MTX
Length	mm (in)	L_1	834.3 (32.84)
		L_2	584.0 (22.99)
		L_3	437.0 (17.20)
Outer diameter	mm (in)	D_1	75.0 (2.95)
		D_2	57.0 (2.24)
		D_3	57.0 (2.24)



PROPELLER SHAFT



A three-piece, four-joint type propeller shaft is used.
By employing two centre bearings for support of the propeller shaft assembly, the shaft's flexibility is increased, thus reducing the amount of vibration and noise at high speed.
A Lobro joint is used for the front joint of MTX models for reduction of torque fluctuation, vibration and noise at the high-rpm range.

FRONT AND REAR AXLES

OUTLINE

OUTLINE OF CONSTRUCTION .... M—1
SPECIFICATIONS .... M—1

REAR AXLE AND DIFFERENTIAL

REAR AXLE .... M—2
DIFFERENTIAL .... M—2
PROCESS OF POWER TRANSMISSION .... M—3

OUTLINE

OUTLINE OF CONSTRUCTION

1. Double-offset joints, which feature low rotational fluctuation and low noise, and show excellent vibration resistance, are used for the driveshafts.
2. Joint shafts are used, and, because of the resultant equal lengths of the left and right driveshafts, torque-steer during sudden acceleration is reduced.
3. A viscous limited-slip differential is used.
4. Angular type ball bearings are used for the rear wheel bearings for improved durability and serviceability.

SPECIFICATIONS

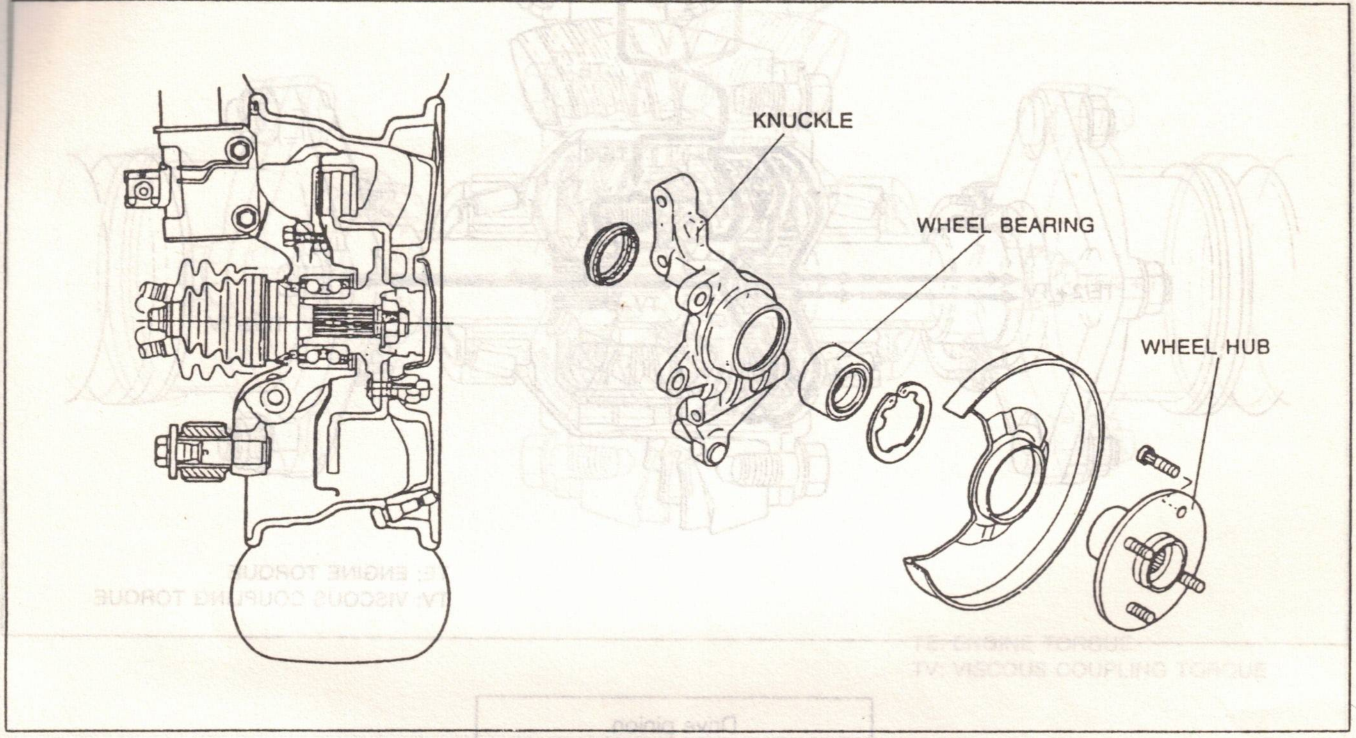
Engine/Transaxle **Item**			**BP DOHC turbo** **MTX**
Rear axle			
Wheel bearing axial play	Maximum mm (in)		0.05 (0.002)
Rear differential			
Reduction gear			Hypoid gear
Differential gear			Straight bevel gear
Reduction ratio			3.909
Number of teeth	Ring gear		43
	Drive pinion gear		11
Differential oil	Grade		API Service GL-5
	Viscosity	Above −18°C (0°F)	SAE 90
		Below −18°C (0°F)	SAE 80W
	Capacity liter (US qt, Imp qt)		0.65 (0.69, 0.57)
Rear driveshaft			
Joint type	Inside		Double-offset joint
	Outside		Bell joint
Length of shaft	Right mm (in)		689 (27.12)
	Left mm (in)		659 (25.94)
Shaft diameter mm (in)			21 (0.82)

REAR AXLE AND DIFFERENTIAL

REAR AXLE

Wheel Bearing

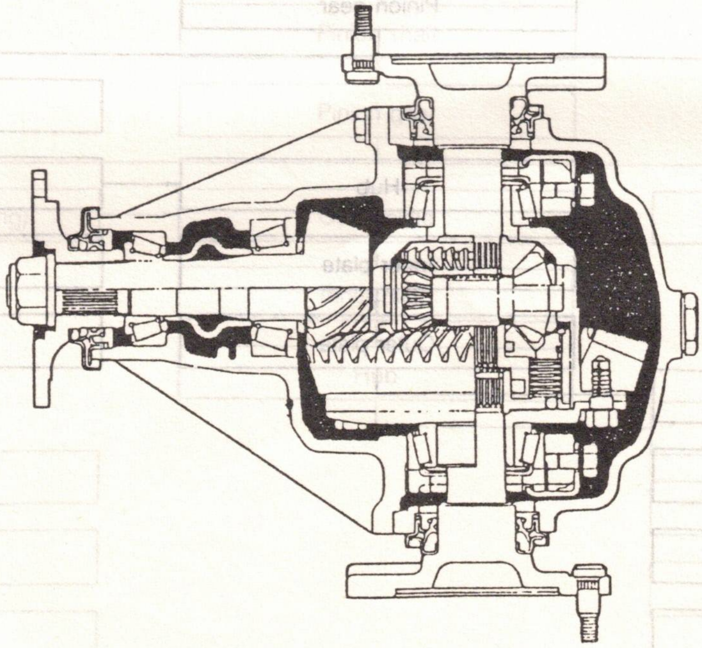
- Angular type ball bearings, for which the bearing preload is set by tightening the driveshaft nut to the specified torque, are employed for the wheel bearings, thus improving durability and serviceability.



DIFFERENTIAL

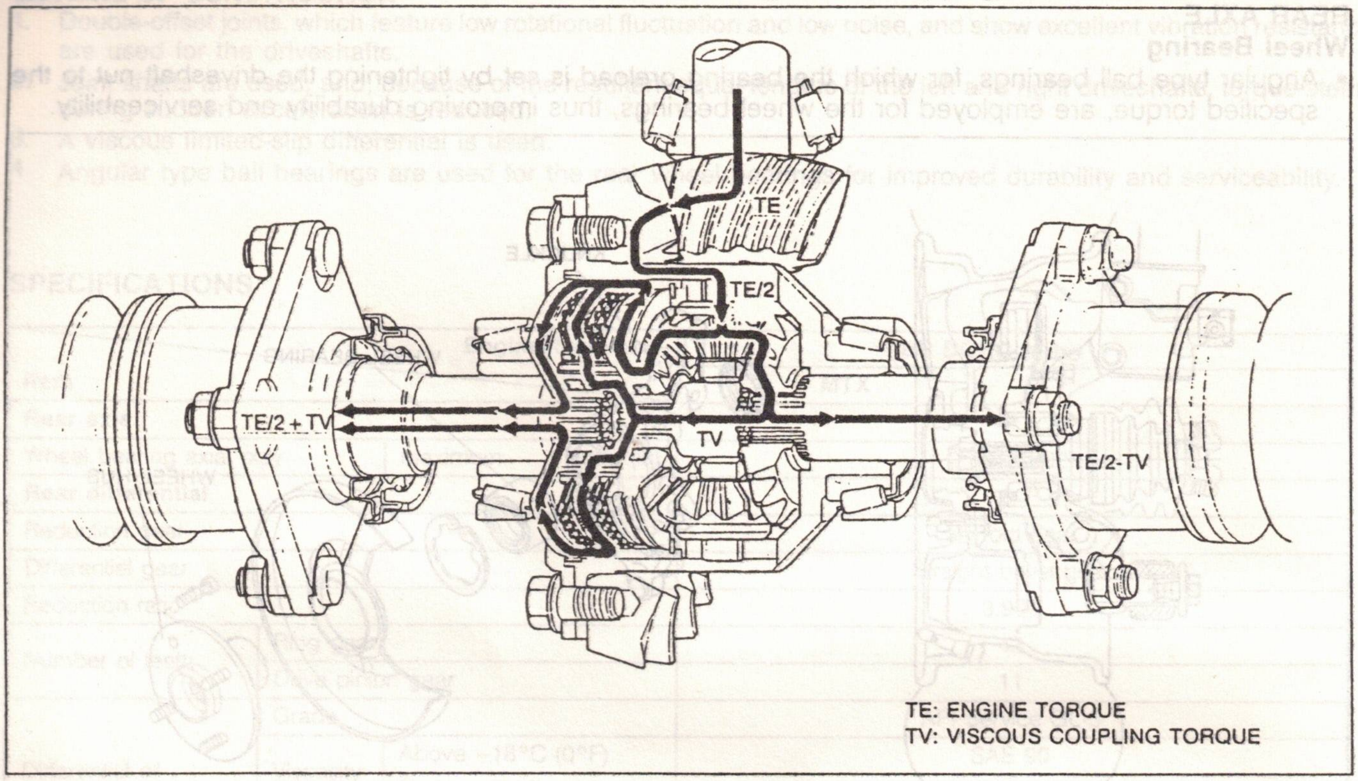
Viscous Limited-Slip Differential

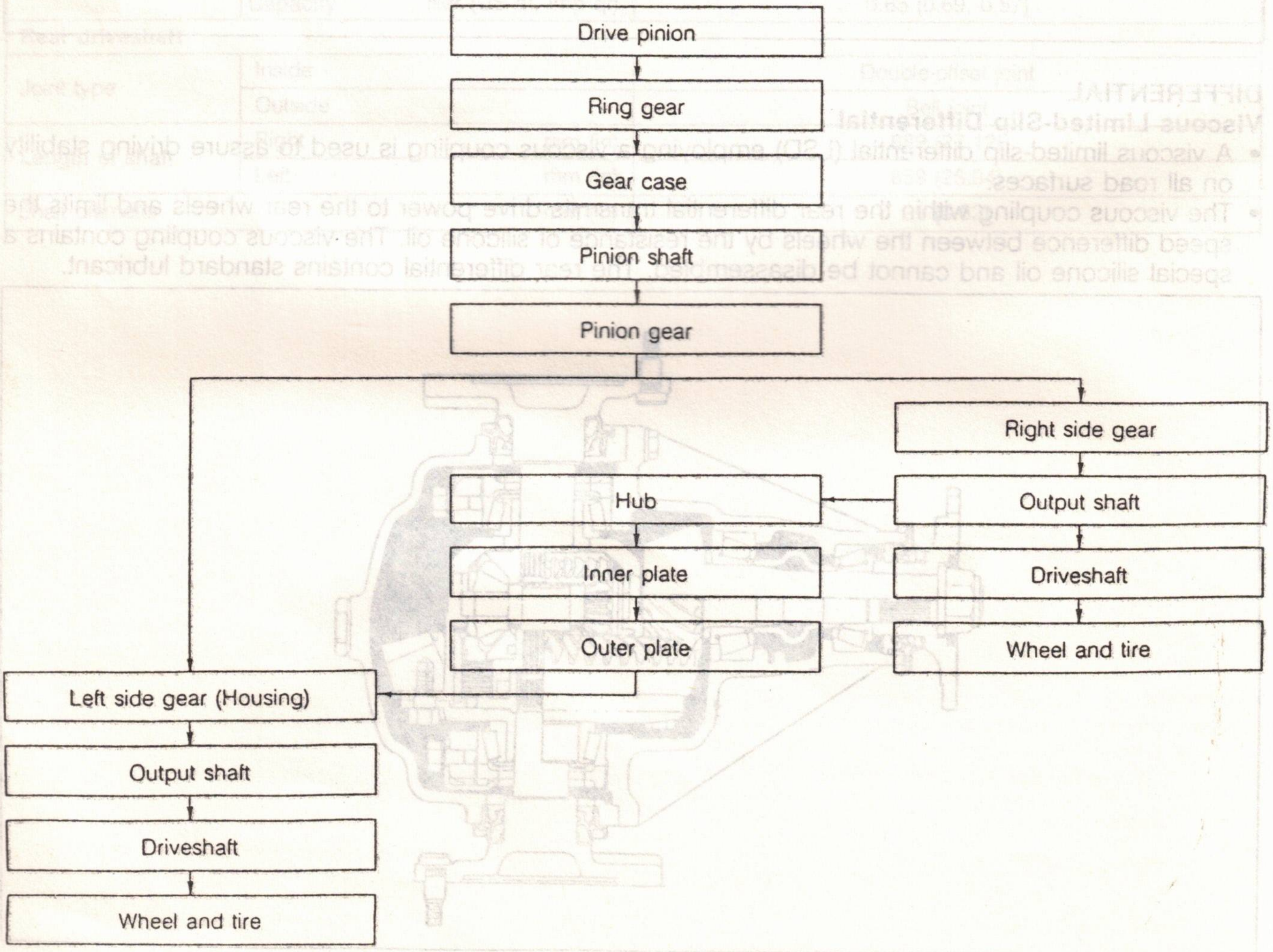
- A viscous limited-slip differential (LSD) employing a viscous coupling is used to assure driving stability on all road surfaces.
- The viscous coupling within the rear differential transmits drive power to the rear wheels and limits the speed difference between the wheels by the resistance of silicone oil. The viscous coupling contains a special silicone oil and cannot be disassembled. The rear differential contains standard lubricant.



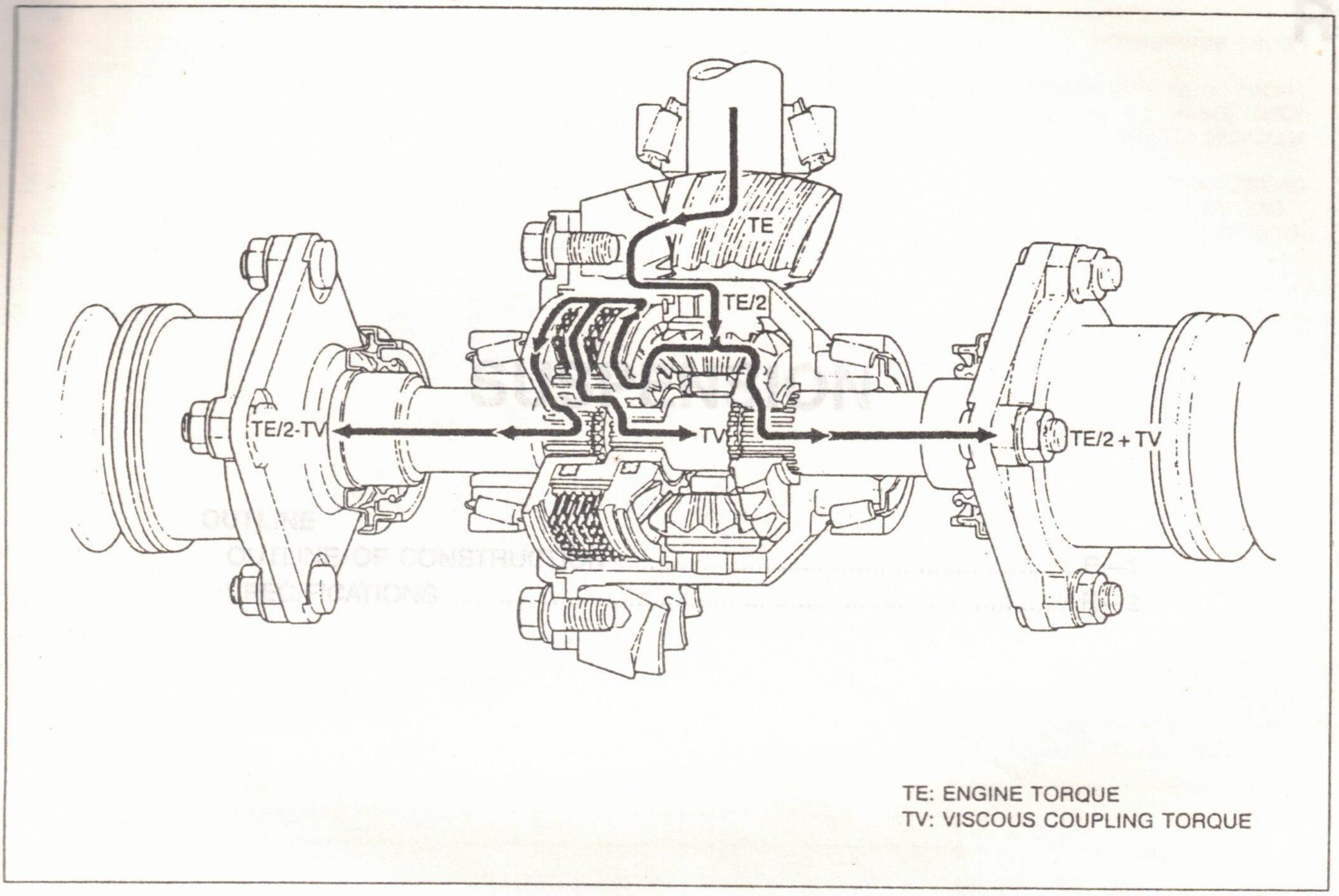
PROCESS OF POWER TRANSMISSION

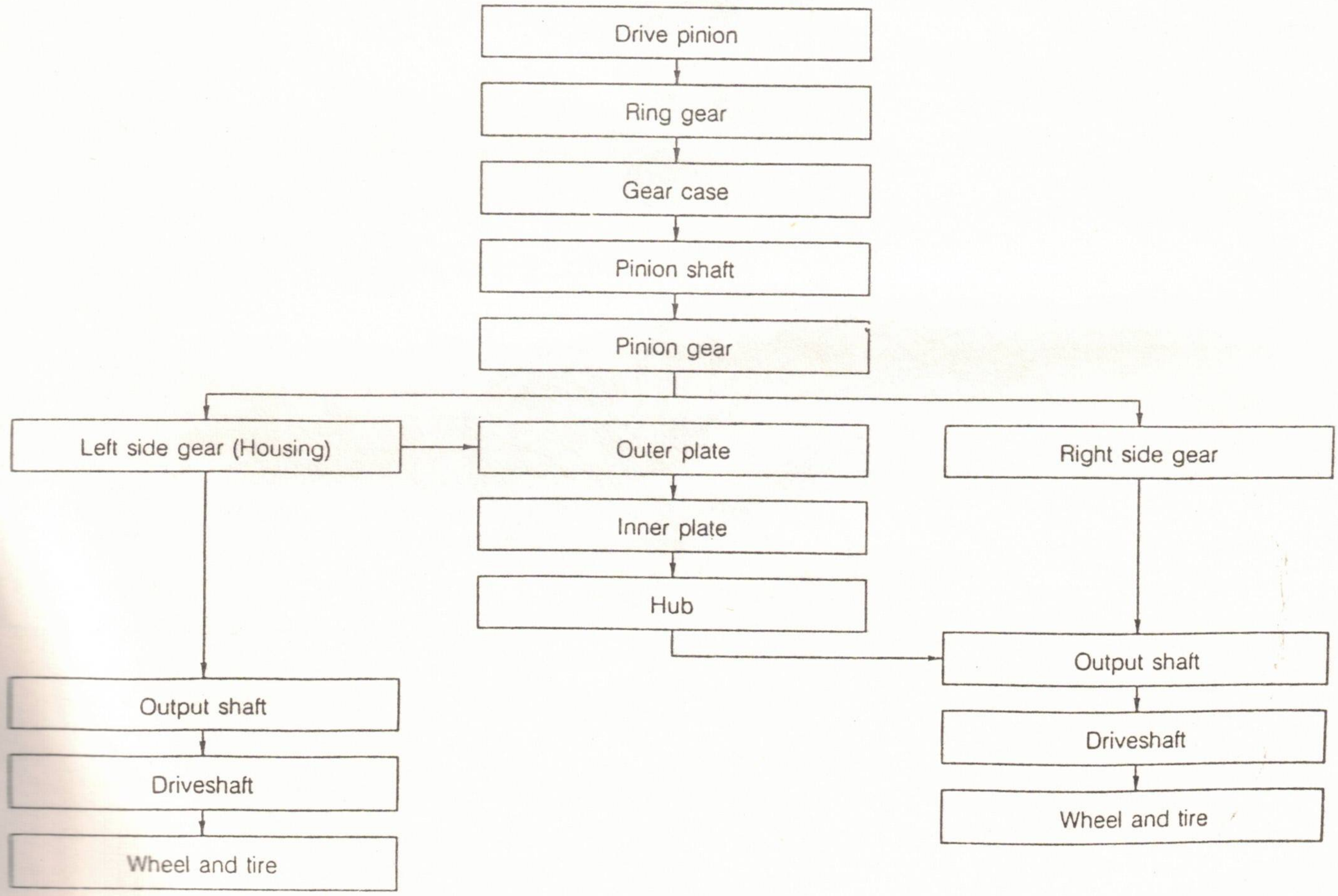
Speed of right wheel greater than left wheel (Left turn or right wheel slipping)





Speed of left wheel greater than right wheel



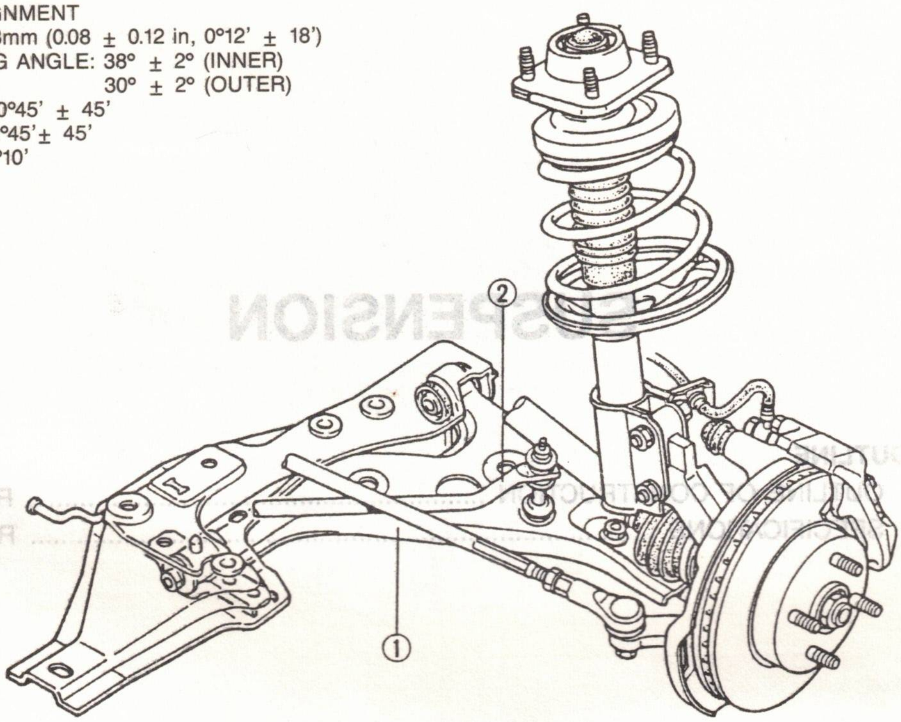


SUSPENSION

OUTLINE
OUTLINE OF CONSTRUCTION .... R—1
SPECIFICATIONS .... R—2

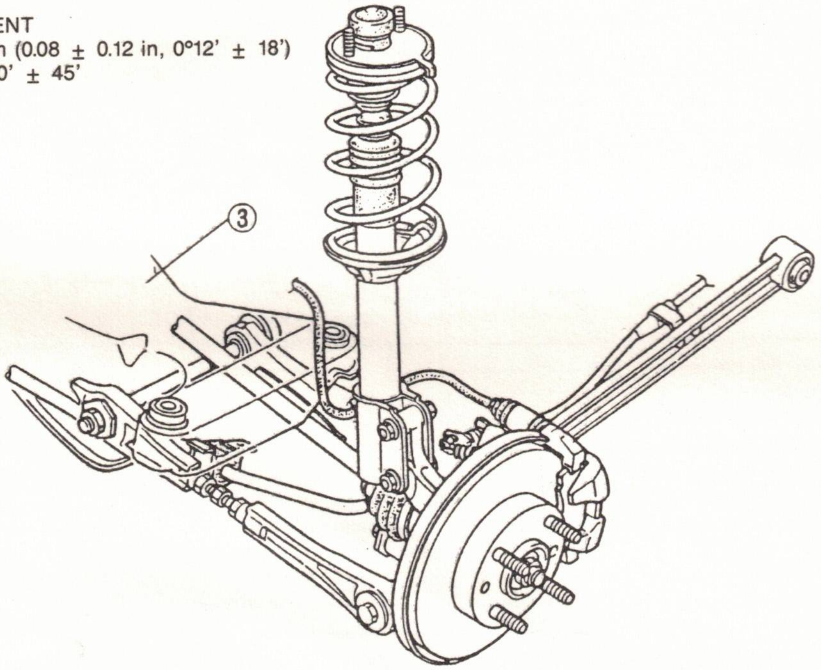
FRONT SUSPENSION

FRONT WHEEL ALIGNMENT
TOTAL TOE-IN: 2 ± 3mm (0.08 ± 0.12 in, 0°12' ± 18')
MAXIMUM STEERING ANGLE: 38° ± 2° (INNER)
30° ± 2° (OUTER)
CAMBER ANGLE: —0°45' ± 45'
CASTER ANGLE: 2°45'± 45'
KINGPIN ANGLE: 12°10'



REAR SUSPENSION

REAR WHEEL ALIGNMENT
TOTAL TOE-IN: 2 ± 3mm (0.08 ± 0.12 in, 0°12' ± 18')
CAMBER ANGLE: —0°20' ± 45'



OUTLINE

OUTLINE OF CONSTRUCTION

- The suspension system is basically the same as for 2WD models.
- Wheel alignment, shock absorber, coil spring specifications are different from 2WD models.

SPECIFICATIONS

Item			BP DOHC TURBO
Front suspension			
Suspension type			Strut
Spring type			Coil spring
Shock absorber	Type		Oil
	Damping force N (kg, lb) at 0.3 m/s	Extended	903(92,202)
		Compressed	373(38,84)
Stabilizer	Type		Torsion bar
	Diameter mm (in)		22.0 (0.87)
Front wheel alignment (*Unladen)	Total toe-in	mm (in)	2 ± 3 (0.08 ± 0.12)
		degree	0°12′ ± 18′
	Turning angle degree	Inner	38° ± 2°
		Outer	30° ± 2°
	Camber angle degree		–0°45′ ± 45′
	Caster angle degree		2°45′ ± 45′
	Kingpin angle degree		12°10′
Rear suspension			
Suspension type			Strut
Spring type			Coil spring
Shock absorber	Type		Oil
	Damping force N (kg, lb) at 0.3 m/s	Extended	834(85,187)
		Compressed	353(36,79.2)
Stabilizer	Type		Torsion bar
	Diameter mm (in)		20(0.79) 20 (0.79)
Rear wheel alignment (*Unladen)	Total toe-in	mm (in)	2 ± 3 (0.08 ± 0.12)
		degree	0°12′ ± 18′
	Camber angle degree		–0°20′ ± 45′

* Fuel tank full; radiator coolant and engine oil at specified levels; and spare tyre, jack, and tools in designated positions.

Coil Spring Specifications

Item	Wire diameter mm (in)	Coil outer diameter mm (in)	Free length mm (in)	Coil number	Identification mark color	
					*1M	*2A
Front	14.4 (0.57)	147.0—173.0 (5.79—6.81)	263.0 (10.35)	3.24	Purple	Blue
Rear	9.7—11.7 (0.38—0.46)	140 (5.5)	337 (13.27)	5.55	Brown	—

*1 Main identification mark color: Indicated on second coil from bottom.
*2 Auxiliary identification mark color: Indicated on third coil from bottom.

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